PAGE'S WEEKLY

A Weekly Newspaper Devoted to the Engineering, Shipbuilding, Iron and Steel Trades.

OFFICES: CLUN HOUSE, SURREY STREET, STRAND, LONDON, W.C.

No. 77. VOL. 8.
Registered as a Newspaper.

LONDON, FRIDAY, MARCH 2, 1906.

PRICE 6d.

MAR 7 1906

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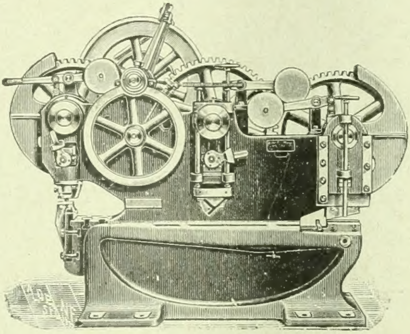

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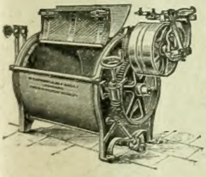

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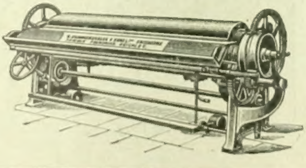

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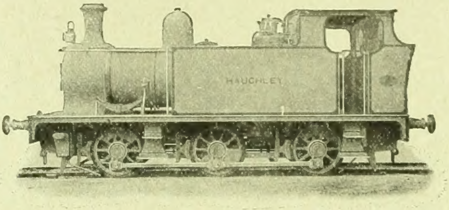

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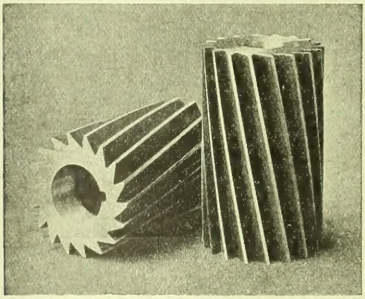

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PAGE'S WEEKLY Miscellaneous

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Consulting and Organising Engineer for Water Works and Industrial Undertakings,

19, OLD QUEEN ST., WESTMINSTER, S.W.

Telephone No.: 5754 Bank. Write for particulars.

PATENTS.

Mr. J. G. LORRAIN, M.I.E.E., M.I.Mech.E., Fellow of the Chartered Institute of Patent Agents.

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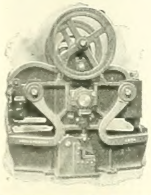
"PATENTEES' HANDBOOK," post free on application, gives Full Information to Inventors and upon all the chief points of the Patent Law. *Telegrams: "Lorrain, London."*



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	Size.	Working Pressure.
One Thompson Boiler,	30 ft. by 8 ft. 6 in.	for 160 lb.
Three ,, ,,	30 ft. ,, 8 ft. 6 in.	,, 120 lb.
One ,, ,,	30 ft. ,, 8 ft. 6 in.	,, 100 lb.
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All sizes of Vertical Boilers from 2 to 20 n.h.p.

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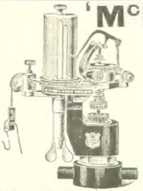

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PATENT WATER-TUBE BOILERS.

These Boilers are in use throughout the world to the extent of 4,700,000 h.p. generating steam for all purposes, and fired with all kinds of fuel. *See our Advertisement appearing March 16th, page 37.*

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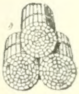
Firewood Splitting and Bundling Machines.



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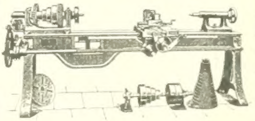

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PAGE'S WEEKLY Miscellaneous

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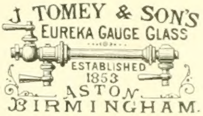
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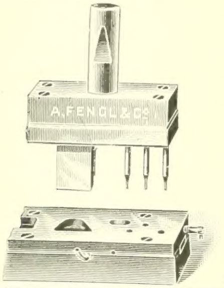
For High Pressure Boilers



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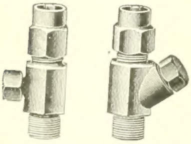
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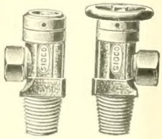

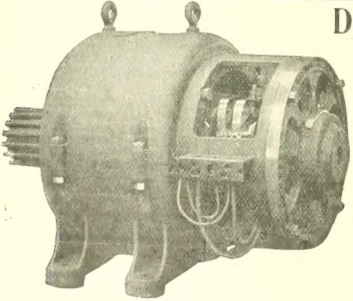
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For Rapid and Economical Handling of General Cargo, Coal, Ore, &c.

See our Advertisement in March 16th issue.

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Telephone: 365 London Wall. Telegrams: "Transumo."

PAGE'S WEEKLY Miscellaneous

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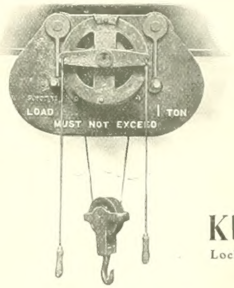

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For 5 and 10 cwts., and 1, 2, and 3 tons.
Portable Electrical Drilling Equipments and Flexible Shafts.

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Tanks CAST IRON AND STEEL.
Patent Standard Steel Tanks from Stock.
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Situated on Pascagoula Bay and on the line of the Louisville and Nashville Railroad. These works have been in operation for more than twenty-six years. ORDERS for Creosoted Piles, Telegraph Poles, Cross Arms, Electric Conduits, Paving Blocks, Sawed Tiles, and Timber PROMPTLY EXECUTED. New cylinders, 115 ft. long. Capacity, one million feet per month. A.B.C. Code used. Cable address: Pierre, West Pascagoula, Miss.—Address, JNO. B. LINDSEY, Superintendent.

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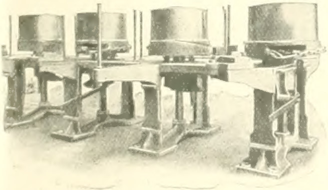

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Wire-Drawing Blocks for all kinds of Metal.

MODERN WIRE-WORKING MACHINERY.
Wire-Weaving Power Looms, Netting Machinery, Complete Machinery for Electrical Wire, Wire Rope and Wire Testing Machinery.

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FOR RAISING SEWAGE, SLUDGE, WATER, &c.
Air Compressing Machinery
FOR ALL SERVICES.
HUGHES & LANCASTER
16, VICTORIA STREET, LONDON, S.W.

PAGE'S WEEKLY Contracts

CONTRACTS.

PONTYPRIDD URBAN DISTRICT COUNCIL.

The Urban District Council of Pontypridd are prepared to receive TENDERS for the following:—

Section K.—RESERVOIR.
" L.—CONDENSING PLANT, COOLING TOWER, and TANK.
" U.—ARTESIAN WELL.

Specifications, Quantities, General Conditions, and Forms of Tender, may be obtained on and after the 12th inst. at the offices of the Consulting Engineer, Mr. REGINALD P. WILSON, 66, Victoria Street. Westminster, or at the Council Offices, Pontypridd, on payment of the sum of Three Guineas for each section.

This sum is required as a deposit, and will, after the Council shall have entered into a contract upon the Tenders received, but not before, be returned to the tenderer, provided he shall have sent in a *bona fide* Tender, and shall not have withdrawn the same. In any other case the deposit will be forfeited.

The Tender must be sent in on the official form, and all instructions contained therein must be complied with.

Tenders, endorsed "Section K.—Reservoir," "Section L.—Condensers," or "Section U—Artesian Well," must be addressed to the Clerk of the Pontypridd Urban District Council, and must be delivered at the Council Offices, Pontypridd, not later than 12 noon on Saturday, March 3rd, 1906.

The Council do not bind themselves to accept the lowest or any Tender.

J. COLENSO JONES,
Clerk to the Council.

Council Offices, Pontypridd.

BOROUGH OF WIMBLEDON.

ANNUAL CONTRACTS.

The CORPORATION are prepared to receive TENDERS for the EXECUTION and SUPPLY during the Year ending March 31st, 1907, of the FOLLOWING WORKS, MATERIALS, etc., namely—

ELECTRICITY DEPARTMENT.

1. Engine-Room Stores.
2. Cables.
3. Joint-Boxes and Jointing Material.
4. Transformers.
5. Meters.
6. Lubricating Oils.
7. Incandeseent Electric Lamps, Carbons, and Accessories.
8. Castings.
9. Firebricks and Fireclay.

Forms of Specifications and Tender, with Conditions of Contract, may be obtained, and Samples inspected, on application to the Chief Electrical Engineer, Electric Light Works, Durnsford Road, Wimbledon.

Sealed Tenders, endorsed "Tender for ——," must be addressed to me and delivered at my offices before noon on Saturday, the 17th day of March, 1906.

The lowest or any Tender will not necessarily be accepted.

By order,
A. STEELE SHELDON,
Town Clerk.

Town Clerk's Office, Wimbledon,
February 15th, 1906.

ASYLUMS COMMITTEE OF THE LONDON COUNTY COUNCIL

The Asylums Committee of the London County Council are prepared to receive TENDERS for the INSTALLATION of ELECTRIC LIGHTING and POWER (excluding Generating Plant) at the Long Grove Asylum, Epsom, Surrey, now in course of erection.

Instructions for Tender and Forms of Tender and Contract, with Specification and Schedules thereto annexed, together with plans and cover, can be obtained from the Clerk of the Committee, No. 6, Waterloo Place, London, S.W., on or after Monday, the 26th inst., on payment of a deposit of £5 for each copy.

The amount deposited will, after the Committee have come to a decision upon the Tenders received, but not before, be returned to the Tenderer, provided he shall have sent in a *bona fide* Tender and shall not have withdrawn the same.

Tenders must be on the printed form, and must be accompanied by the Form of Contract and Schedules thereto and bond.

The Tender and accompanying documents, completed in accordance with the instructions, must be enclosed in the authorised sealed cover, endorsed "Tender for Electric Lighting, Long Grove Asylum," and be delivered at the office of the Committee, 6, Waterloo Place, London, S.W., on or before Monday, the 26th of March, 1906, after which no Tender will be received.

Any Tender not made on the printed form, or not filled up and complete in every particular in accordance with the instructions, will be rejected.

The Committee do not bind themselves to accept the lowest or any Tender.

The Contractor will have to enter into a bond in the penal sum of £800, with two approved sureties, each in the sum of £400, as security for the due performance of the contract.

H. F. KEENE,
Clerk of the Asylums Committee.

Asylums Committee Office, 6, Waterloo Place,
February 21st, 1906.

EDINBURGH CORPORATION.

ELECTRICITY SUPPLY.

The Lord Provost, Magistrates, and Council of the City of Edinburgh are prepared to receive TENDERS for the following MATERIAL for the Electricity Supply Department for the year from May 16th, 1906.

1. ARC LAMP CARBONS.
2. CAST-IRON PAVEMENT BOXES and CAST-IRON PIPES.
3. ELECTRICITY METERS.
4. HOUSE SERVICE FUSE BOXES.
5. BITUMEN.

Specifications and Forms of Tender can be obtained at the Engineer's Office, 5, Dewar Place, Edinburgh, on payment of a deposit of £1 1s. for each Specification, which will be refunded on receipt of a *bona fide* Tender along with the Specification and Drawings.

Sealed Tenders, endorsed with the title of the Specification, must be sent to the Town Clerk, City Chambers, Edinburgh, not later than Monday, March 12th, 1906.

FRANK A. NEWINGTON, Engineer.

Electricity Supply Station, Edinburgh,
February 20th, 1906.

THE URBAN DISTRICT COUNCIL OF BARNES.

ELECTRICITY DEPARTMENT.

The Urban District Council of Barnes are prepared to receive TENDERS for the Supply, Delivery, and Erection of—

Section 3. ONE STRAIGHT-TUBE-TYPE WATER-TUBE BOILER.
Section 5. SURFACE CONDENSER, FEED PUMP AND PIPEWORK.

Specifications and Drawings, together with General Conditions and Form of Tender, may be obtained from the undersigned on payment of a deposit of one guinea for each section, which will be returned on receipt of a *bona fide* Tender.

Tenders to be sealed and endorsed "Boiler," and "Condenser," and delivered to the Clerk, Council House, High Street, Mortlake, S.W., not later than March 12th, 1906.

The Council do not bind themselves to accept the lowest or any Tender.

C. S. DAVIDSON,
Electrical Engineer.

Electricity Works, High Street, Mortlake, S.W.

MUNICIPAL COUNCIL OF SYDNEY, N.S.W.

ELECTRICITY DEPARTMENT.

The Council is prepared to receive TENDERS for the SUPPLY and ERECTION of—

A. BOILERS, AUTOMATIC STOKERS, PIPEWORK, &c.
B. TURBO-ALTERNATOR, SUB-STATION MACHINERY, SWITCHBOARDS, &c.

Specifications, Plans, and Form of Tender may be obtained on application to Mr. T. ROOKE, at the offices of Messrs. Preece and Cardew, 8, Queen Anne's Gate, Westminster, on and after Monday, February 12th.

A deposit of Five Guineas will be required on application, which will be refunded on receipt of a *bona fide* Tender as directed, and a cash deposit or marked cheque for the sum of £1,000 will be required when the Tender is sent in.

Sealed Tenders, endorsed "Tender for Electric Lighting Plant," are to be addressed to the Town Clerk, Town Hall, Sydney, and must be delivered at the Town Hall on or before 4 p.m. Monday, May 7th, 1906.

The Council does not bind itself to accept the lowest or any Tender.

(Signed) THOMAS H. NESBITT,
Town Clerk.

CITY OF LEEDS.—ELECTRIC LIGHTING DEPARTMENT.

TURBO-ALTERNATORS, CONDENSERS, &c.

The Electricity Committee of the Leeds City Council are prepared to receive TENDERS for PLANT as below—

> One or Two Sets of Electric Generating and Condensing Plant, each comprising a Steam Turbine, Two-phase Alternator and Exciter of 3,000 kw. capacity, Electrically driven Surface Condensing Plant, and the necessary Pipes and Valves.

Tenders must include the whole of the work specified, as offers of separate sections will not be considered. Preference will be given to Tenders for Plant of British Manufacture. Copies of the General Conditions, Specification, and Form of Tender, may be obtained from Mr. HAROLD DICKINSON, Manager of the Department, 1, Whitehall Road, Leeds, on payment of a deposit of Two Guineas, which will be refunded on receipt of a *bona fide* Tender.

Tenders must be in the form attached to the Specification, and must be delivered to me at the Town Hall, Leeds, not later than 10 o'clock in the forenoon, on Monday, the 9th day of April, 1906, in sealed envelopes, endorsed "Electric Lighting—Tender for Generating Plant."

The Corporation do not bind themselves to accept the lowest or any of the Tenders sent in.

ROBERT E. FOX,
Town Clerk.

Leeds, February 22nd, 1906.

PAGE'S WEEKLY Contracts and Appointments Open

BOROUGH OF PORTSMOUTH.

The CORPORATION invite Tenders for the following:—

1 Straight Tube type Water-Tube Boiler.
1 Economiser.
Boiler Feed Pumps.
Surface Condenser and Cooling Tower.
1 Triple Expansion 1,000 kw. Slow Speed Vertical Generating Set.
Alterations and additions to Switchboard.

The Specifications and Drawings with General Conditions and Form of Tender can be obtained on application to the undersigned, and a deposit of Five Guineas must accompany any such application, which, however, will be returned on receipt of a *bona fide* Tender.

Any further particulars can be obtained on application to Mr. V. G. Lironi, M.I.M.E., A.M.I.E.E., Tramways Engineer, Engineer's Office, Vivash Road, Fratton, Portsmouth.

The Form of Tender must include a declaration that the person making the Tender pays not less than the trade union rate of wages, and observing the hours of labour and conditions recognised and in practice obtained by the trade unionists in the place or places where the Contract is executed.

Tenders must be delivered to the Town Clerk, Town Hall, Portsmouth, not later than 6 p.m. on Monday, March 5th, 1906.

The Corporation do not bind themselves to accept the lowest or any Tender.

ALEXANDER HELLARD,
Town Clerk.

Town Hall, Portsmouth,
February 13th, 1906.

TO ROOF CONTRACTORS.

THE DIRECTORS OF THE SHEFFIELD

United Gas Light Company invite TENDERS for the SUPPLY and ERECTION at their Neepsend Station of a STEEL ROOF, 263 ft. long by about 57 ft. span, together with the RAISING of the TWO existing SIDE SPANS, one of which is 263 ft. long by 19 ft. 10 in. and the other 145 ft. long by 19 ft. 6 in., the whole forming part of the roof over the No. 2 Retort House.

Drawings may be seen, and Bill of Quantities, with Specification and Form of Tender obtained upon application to the Company's Engineer, Mr. John W. Morrison, Commercial Street, on and after Monday, February 19th.

The Directors do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Tender for Roof," must be delivered by post to the undersigned not later than the first post on Tuesday, the 6th day of March.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
February 14th, 1906.

COUNTY BOROUGH OF HUDDERSFIELD.

TRAMWAYS COMMITTEE.

The Corporation are prepared to receive TENDERS from competent Contractors for the supply and erection of the following plant, viz.:—

1. ONE VERTICAL CROSS COMPOUND CONDENSING ENGINE AND STEAM PIPING IN CONNECTION THEREWITH.
2. ONE 750-kw. TRACTION GENERATOR, EXTENSION TO SWITCHBOARD, CABLES, &c.

Parties desiring to submit Tenders may inspect the Drawings and obtain the Specifications, Bills of Quantities, Forms of Tender, and other particulars, upon application to the Engineer, Mr. K. F. Campbell, M.I.C.E., M.I.E.E., on payment of a deposit of £3 3s. This amount will be returned to the Tenderer after the Council have come to a decision on the Tenders received, provided he shall have sent in a *bona fide* Tender, and shall not have withdrawn the same.

The successful Tenderers will be required to execute a contract, the draft of which may be inspected at the Town Clerk's Office, Town Hall, between 10 and 4 o'clock, except on Saturdays.

Tenders must be on the official forms, and the printed instructions contained therein must be strictly complied with.

Each Tender in a sealed envelope, which will be provided, along with the filled-up Bill of Quantities, must be delivered to the Town Clerk, Town Hall, Huddersfield, not later than 10 a.m. on the 9th day of March, 1906.

The Corporation do not guarantee the acceptance of the lowest or any Tender, and reserve the right to let the work in one contract, or in sections, as described.

J. HENRY FIELD,
Town Clerk.

Town Hall, February, 1906.

APPOINTMENTS OPEN.

INDIAN PUBLIC WORKS DEPARTMENT.

The Secretary of State for India in Council will, in the Summer of 1906, make not less than TEN APPOINTMENTS of ASSISTANT ENGINEER in the Permanent Establishment of the Indian Public Works Department, in addition to the appointments to be made from Cooper's Hill College.

The age of Candidates must not be less than 21, or more than 24 years on the 1st July, 1906.

A printed Form of Application, together with information regarding the conditions of the appointments and certain requirements laid down as to education and experience in engineering, may be obtained from the Secretary, Public Department, India Office, Whitehall, London, S.W.

The Form of Application is to be returned so as to reach him not later than Tuesday, 1st May next.

A. GODLEY,
Under Secretary of State.

India Office, December 19th, 1905.

COUNTY OF LONDON.—THE LONDON

COUNTY COUNCIL REQUIRES the SERVICES of an ELECTRICAL and MECHANICAL ENGINEER and an ASSISTANT ELECTRICAL ENGINEER.

Candidates for the appointment of Electrical and Mechanical Engineer must not be over forty years of age, and preference will be given to a candidate who is connected with the Institution of Civil Engineers, the Institution of Mechanical Engineers, or the Institution of Electrical Engineers.

Candidates must possess a thorough knowledge of all systems of electric lighting and heating, and should have had a good theoretical and practical experience in connection with installing the same.

The person appointed will be responsible to the Chief Officer of the Fire Brigade for all reports and other matters connected with the electric lighting and heating arrangements at theatres and other places of public entertainment, and such other buildings as the Chief Officer of the Fire Brigade may direct, and for carrying out any duties appertaining to the above, and in connection with the Fire Brigade.

Candidates for the appointment of Assistant Electrical Engineer must not be over thirty-five years of age and must have a thorough knowledge of all systems of electric lighting, and have had a good theoretical and practical experience in connection with the installation of electric light systems.

Preference will be given to a candidate connected with the Institution of Electrical Engineers.

The person appointed will be required to assist in inspecting and supervising the electric light arrangements at theatres and other places of public entertainment, and such other buildings as the Chief Officer of the Fire Brigade may direct.

The salary attached to the appointment of Electrical and Mechanical Engineer will be £400 a year, and to the appointment of Assistant Electrical Engineer £200 a year.

The persons appointed will hold their office during the pleasure of the Council, will be required to give their whole time to the duties of their office, and will not be allowed to take any private practice, to hold any other appointment, or to occupy any other paid position, and any fees received by them either as witnesses or in any other capacity are to be paid to the Council.

The persons appointed will further be required to conform to the Council's regulations in respect of the Superannuation and Provident Fund, in the benefits of which they will participate.

Forms of application can be obtained either by applying personally or by sending a stamped addressed foolscap envelope to the "Clerk of the London County Council, Spring Gardens, S.W.," and the latest time for receiving applications is 10 a.m. on Monday, March 12th, 1906.

Any application which fails to comply with the terms of this advertisement will not be laid before the Council.

Personal canvassing of members of the Council is strictly prohibited

G. L. GOMME,
Clerk of the London County Council.

County Hall, Spring Gardens, S.W.,
February 22nd, 1906.

BOROUGH OF HARROGATE.—

APPOINTMENT OF WATERWORKS ENGINEER AND MANAGER.

The Corporation of Harrogate are prepared to receive APPLICATIONS for the APPOINTMENT of WATERWORKS ENGINEER and MANAGER.

Salary £250 per annum.

Particulars of duties may be had at my office.

Candidates for the appointment are requested to send their applications stating their age, qualifications, and experience, and enclosing copies of not exceeding three testimonials of recent date, addressed to the Town Clerk, Harrogate, and endorsed "Appointment of Waterworks Engineer," not later than March 7th, 1906, after which no applications will be received.

Canvassing will be considered a disqualification.

J. TURNER TAYLOR,
Town Clerk.

Municipal Offices, Harrogate,
February 16th, 1906.

Buyers' Directory.

NOTE.—The display advertisements of the firms mentioned under each heading can be found readily by reference to the Alphabetical Index to Advertisers on pages 22 and 24.

In order to assure fair treatment to advertisers, each firm is indexed under its leading speciality ONLY.

Advertisers who prefer, however, to be entered under two or more different sections can do so by an annual payment of 5s. for each additional section.

Advertisers' Service Bureau.
British Advertiser Service Bureau, Queen Anne's Chambers, Westminster, S.W.

Artesian Well Machinery.
John Z. Thom, Patricroft, Manchester.

Band Sawing Machines.
Noble & Lund, Ltd., Felling-on-Tyne.

Bearings (Roller).
Hyatt Roller Bearing Co., 47, Victoria Street, London S.W.

Belting.
Binney & Son, Catherine Street, City Road, London, E.C.
Cort, Arthur, & Co., Camberwell, London, S.E.
Fleming, Birkby & Goodall, Ltd., West Grove, Halifax.
Gilmour, W. & O., St. John's Hill, Edinburgh.

Boilers.
Clayton, Son & Co., Ltd., Leeds City Boiler Works, Leeds.
Hartley & Sugden, Ltd., Halifax.
Thompson, John, Wolverhampton.

Boilers (Water-tube).
Babcock & Wilcox, Ltd., Oriel House, Farringdon Street, London, E.C.
Stirling Boiler Co., Ltd., Motherwell, N.B.

Bolts, Nuts, Rivets, etc.
Bayliss, Jones & Bayliss, Ltd., Monmore Green, Wolverhampton.
Herbert W. Periam, Ltd., Floodgate Street Works, Birmingham.
T. D. Robinson & Co., Ltd., Derby.

Books.
Griffin, Charles, & Co., Exeter Street, Strand, W.C.
New Zealand Mines Record, Wellington, New Zealand.
Spon, E. & F. N., 125, Strand, W.C.

Boring Machines.
Asquith, William, Ltd., Well Road Works, Halifax.
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne.
Swift, George, Clarence Ironworks, Halifax.

Cables.
Callender's Cable and Construction Co., Ltd.

Case-Hardening Compounds.
Hy. Miller & Co., Millgarth Works, Leeds.

Castings.
Ashmore, Benson, Pease & Co., Ltd., Stockton-on-Tees.

Catalogues, Printing, &c.
Atlantic Press, Ltd., Weymouth Street, Manchester.
Spottiswoode Advertising Agency, Clun House, Surrey Street, Strand, W.C.
Stafford, Arthur, & Co., Denton, Manchester.

Chucks.
Fairbanks Co., 78-80, City Road, London, E.C.

Cisterns, Tanks, &c.
Ashmore, Benson, Pease & Co., Ltd., Stockton-on-Tees.
Clayton, Son & Co., Ltd., Hunslet, Leeds.
F. A. Keep, Juxon & Co., Barn Street, Birmingham.

Clutches (Friction).
David Bridge & Co., Castleton Ironworks, Rochdale, Lancashire.

Condensing Plant.
Benn, Sykes, Haslingden, near Manchester.
Concentric Condenser, Ltd., 23, Northumberland Avenue, London, W.C.
Mirrlees-Watson & Co., Ltd., Glasgow

Consulting Engineers.
Gibbs, John, & Son, 80, Juke Street, Liverpool.
G. H. Hughes, A.M.I.M.E., 19, Old Queen Street, Westminster, S.W.
Melville & Macalpine, 615, Walnut Street, Philadelphia, Pa., U.S.A.
Mount-Haes, A., M.I.Mech.E., M.I.M.E., 11, Ironmonger Lane, London, E.C.

Continental Railway Arrangements.
Northern Railway of France.
South Eastern & Chatham Railway Co.

Conveying and Elevating Machinery.
Adolf Bleichert & Co., Leipzig-Gohlis, Germany.
Temperley Transporter Co., 72, Bishopsgate Street Within London, E.C.

Copper and Brass.
W. Hepton & Son, Hunslet Lane, Leeds.

Coverings (Boiler).
Magnesia Covering Ltd., Washington Station, co. Durham.

Cranes, Travellers, Winches, etc.
Joseph Booth & Bros. Ltd, Rodley, Leeds.
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.

Cranks.
Clarke's Crank & Forge Co. Ltd., Lincoln, England.

Cutters (Milling).
Pratt & Whitney Co., 23-25, Victoria Street, London, S.W.
E. G. Wrigley & Co., Ltd., Foundry Lane Works, Soho, Birmingham.

Destructors.
Heenan & Froude, 4, Chapel Walks, Manchester.
Horsfall Destructor Co., Ltd., Armley, Leeds.

Dredges and Excavators.
Delange & Cie, Mce., Hoboken, near Antwerp
Rose, Downs & Thompson, Ltd., Old Foundry, Hull.

Drilling Machines.
Asquith, William, Ltd., Well Road Works, Halifax.
Niles-Bement-Pond Co., 23-25, Victoria Street London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne
Swift, George, Clarence Ironworks, Halifax.

Economisers.
E. Green & Son, Ltd., Manchester.

Ejectors (Pneumatic).
Hughes & Lancaster, 16, Victoria Street, London, S.W.

Electrical Apparatus.
Allgemeine Elektricitäts Gesellschaft, Berlin, Germany.
British Westinghouse Electric and Manufacturing Co., Ltd., Norfolk Street, Strand, London, W.C.
Broadbent, T. W., Victoria Electrical Works, Huddersfield.
Crypto Electrical Co., 3, Tyer's Gateway, Bermondsey Street, London, S.E.
Ebonestos Manufacturing Co., 22, Rosoman Street, London, E.C.
Gent & Co., Ltd., Faraday Works, Leicester.
Greenwood & Batley, Ltd., Albion Works, Leeds.
India Rubber, Gutta Percha, and Telegraph Works Co., Ltd., Silvertown, London, E.
Johnson and Phillips, Ltd., Victoria Works, Old Charlton, Kent.
Matthews & Yates, Ltd., Swinton, Manchester.
Mix and Genest, Berlin, W., Germany.
Nalder Bros. & Thompson, 34, Queen Street, London, E.C.
New Gutta Percha Co., Ltd., Dashwood House, New Broad Street E.C.
Newton Brothers, Full Street, Derby.
Phœnix Dynamo Manufacturing Co., Bradford, Yorks.
Scott, E., & Mountain, Ltd., Newcastle-on-Tyne.
Turner, Atherton & Co., Ltd., Denton, Manchester.
B. Weaver & Co. (*see* Ebonestos Manufacturing Co.), 22, Rosoman Street, Clerkenwell, London, E.C.

Engineers' Supplies.
Ahlers, Ad., Whitley Bay, near Newcastle-on-Tyne.

Engines (Gas).
Campbell Gas Engine Co., Ltd., Halifax.
Cundall, Son & Co., Ltd., Airedale Iron Works, Shipley.

Engines (Electric Lighting).
McLaren, J. and H., Midland Engine Works, Leeds.

Engines (Locomotive).
Baldwin Locomotive Works, Philadelphia, Pa., U.S.A.
Hunslet Engine Co., Ltd., Leeds, England.
Hudswell, Clarke & Co., Ltd., Leeds, England.
McLaren, J. & H., Midland Engine Works, Leeds.

Engines (Oil).
Brown & May, Ltd., Devizes.

Engines (Stationary).
Mirrlees Watson Co., Ltd., Glasgow.

Engines (Traction).
Jno. Fowler & Co. (Leeds), Ltd., Steam Plough Works, Leeds.

Engravers.
Jno. Swain & Son, Ltd., 58, Farringdon Street, London, E.C.

Exhaust Steam Oil Separators.
Lancaster & Tonge, Ltd., Pendleton, Manchester.

Fans, Blowers.
Capel Fan Co., 13, Moseley Street, Newcastle-on-Tyne.
Davidson & Co., Ltd., "Sirocco" Engineering Works, Belfast, Ireland.
Gibbs, John & Son, 80, Juke Street, Liverpool.
Matthews & Yates, Ltd., Swinton, Manchester.

Fencing and Gates (Iron).
Bayliss, Jones & Bayliss, Ltd., Monmore Green, Wolverhampton.

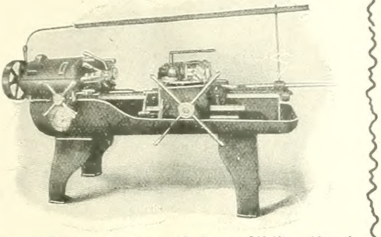
Files.
Flockton, Tompkin & Co., Ltd., Newhall Steel Works, Sheffield.

Fire Bricks.
J. H. Sankey & Son, Ltd., Essex Wharf, Canning Town, London, E.

Firewood Machinery.
M. Glover & Co., Patentees and Saw Mill Engineers, Leeds.
Hill and Herbert, Ltd., Great Central Street, Leicester.

PAGE'S WEEKLY Miscellaneous

HARTNESS
FLAT TURRET LATHE



The only Turret Lathe with Cross-Sliding Head.

JONES & LAMSON MACHINE CO.,
"JUBILEE BUILDINGS,"
97, Queen Victoria Street, LONDON.

ONLY "IDEAL" SAW GUARDS CAN FIT ANY SIZE

SAW GUARDS, BENCHES, SHARPENERS

Adopted by Governments, Corporations, Railway Companies, and Hundreds of leading Timber, Coal, Engineering, Building, Contracting Firms at Home and Abroad.

M. GLOVER & CO., Saw Mill Engineers, **LEEDS.**

TURNER, ATHERTON & CO. LTD

British Make Throughout.

Overhead Passenger Gear.
Coupled to Dust-Proof Electric Motor.

DENTON. MANCHESTER. ELECTRIC LIFTS

Buyers' Directory—(*Continued*).

Fountain Pens.
Mabie, Todd & Bard, 93, Cheapside, London, E.C.

Forging (Drop) Plants.
Brett's Patent Lifter Co., Ltd., Coventry.

Forgings (Drop).
J. H. Williams & Co., Brooklyn, New York, U.S.A

Furnaces.
Deighton's Patent Flue & Tube Company, Vulcan Works, Pepper Road, Leeds.
Leeds Forge Co., Ltd., Leeds.

Gauge Glasses.
J. B. Treasure & Co., Vauxhall Road, Liverpool.
Tomey, J., & Sons, Aston, Birmingham.

Gauges (Pressure, Vacuum, and Hydraulic).
Dobbie, McInnes, Ltd., 45, Bothwell Street, Glasgow.

Gearing.
Ahlers, Ad., Whitley Bay, near Newcastle-on-Tyne.
Angus, G. & Co., Ltd., Newcastle-on-Tyne.
Asquith, William, Ltd., Well Road Works, Halifax.
Dixon, W. F., & Co. 60, Percival Street, C. on-M. Manchester.
Reid Gear Co., Linwood, near Glasgow.
Wild, M. B., & Co., Argyle Street, Nechells, Birmingham.

Greases.
Blumann and Stern, Ltd., Plough Bridge, Deptford, London, S.E.

Hack Saws.
Baynes, Charles, Knuzden Brook, Blackburn.

Hammers (Steam).
Davis & Primrose, Leith Ironworks, Edinburgh.
Niles-Bement Pond Co., 23-25, Victoria Street, London, S.W.

Hoisting Machinery.
See Conveying Machinery.

Horizontal Boring Machines.
Asquith, William, Ltd., Well Road Works, Halifax.
Greenwood & Batley, Albion Works, Leeds.
Niles-Bement Pond Co., 23-25, Victoria Street London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne.
Swift, George, Clarence Ironworks, Halifax.

Hydraulic Leather.
Ahlers, Ad., Whitley Bay, near Newcastle-on-Tyne.

Hydraulic Machine Tools.
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.
Vauxhall and West Hydraulic Engineering Co. Ltd., 23, College Hill, London, E.C.

Icemaking and Refrigerating Machinery.
H. J. West & Co., 114-118, Southwark Bridge Road, London, S.E.

ndicators.
Dobbie McInnes, Ltd., 45, Bothwell Street, Glasgow.
Hannan & Buchanan, 75, Robertson Street, Glasgow.

on and Steel.
Allen, Edgar, & Co. Ltd., Imperial Steel Works, Sheffield.
Askham Bros. & Wilson, Ltd., Sheffield.
Buckley, Saml., St. Paul's Square, Birmingham.
Fairley & Sons, James, Old Mint, Shadwell Street, Birmingham.
Farnley Iron Co., Ltd., Leeds. England.
Flockton, Tompkin & Co., Ltd., Newhall Steel Works, Sheffield.
Fried. Krupp, Grusonwerk, Magdeburg-Buckau, Germany.
J. Frederick Melling, 14, Park Row, Leeds, England.
Parker Foundry Co,, Derby.
Purden, John & Sons, Lambhill Forge, by Maryhill, Glasgow.
Walter Scott, Ltd., Leeds Steel Works, Leeds, England.

Ironwork (Constructional).
F. A. Keep, Juxon & Co., Barn Street, Birmingham.

Ironwork (Galvanised).
F. A. Keep, Juxon & Co., Barn Street, Birmingham.

Lathes.
Asquith, William, Ltd., Well Road Works, Halifax.
Bradbury & Co., Ltd., Wellington Works, Oldham.
Eclipse Tool Manufacturing Co., Linwood, near Glasgow.
Leckenby, Benton, & Co., Perseverance Ironworks, Halifax.
Mitchell, D., & Co., Ltd., Parsonage Works, Keighley.
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne.
Northern Engineering Co. (1900), Ltd., King Cross, near Halifax.
Swift, George, Clarence Ironworks, Halifax.

Lathe Carriers
Williams, J. H., & Co., Brooklyn New York, U.S.A.

Laundry Machinery.
Hill and Herbert, Ltd., Great Central Street, Leicester.
Summerscales, W., & Sons, Ltd., Engineers, Phœnix Foundry, Keighley, England.

Lifts.
Waygood & Co., Ltd., Falmouth Road, London, S.E.

Lubricants.
Blumann & Stern, Ltd., Plough Bridge, Deptford, London. S.E.
Reliance Lubricating Oil Co., The, 19 & 20, Water Lane, Great Tower Street, London, E.C.

Machine Tools.
Asquith, William, Ltd., Well Road Works, Halifax.
George Addy & Co., Waverley Works, Sheffield.
Bateman's Machine Tool Co., Hunslet, Leeds.
Beanland, Perkin, & Co., School Close Works, Leeds.
Bertrams, Ltd., St. Katherine's Works, Sciennes, Edinburgh.
Bradbury & Co., Ltd., Wellington Works, Oldham.
Breuer, Schumacher & Co., Ltd., Kalk, near Cologne-on-Rhine (Germany).
Consolidated Pneumatic Tool Co., Ltd., Palace Chambers, 9, Bridge Street, Westminster, S.W.
Cunliffe & Croom, Ltd., Broughton Ironworks, Manchester.
Dean, Smith & Grace, Ltd., Keighley.
Dempster, Moore & Co., Ltd., 49, Robertson Street, Glasgow.
Fengl, A., & Co., Grafton Street, Altrincham.
Greenwood & Batley, Ltd., Leeds.
Jones & Lamson Machine Co., 97, Queen Victoria Street, London, E.C.
John Lang & Sons, Johnstone, near Glasgow.
Luke & Spencer, Ltd., Broadheath, Manchester.
Jos. C. Nicholson Tool Co., City Rd. Tool Wks., Newcastle-on-Tyne.
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne.
Northern Engineering Co., 1900, Ltd., King Cross, near Halifax.
J. Parkinson & Son, Canal Ironworks, Shipley, Yorkshire.
C. Redman & Sons, Halifax.
Resides, 12, Aire Street, Brighouse, Yorks.
Rice & Co. (Leeds), Ltd., Leeds, England.
G. F. Smith, Ltd., South Parade. Halifax.
Swift, George, Clarence Ironworks, Halifax.
Taylor and Challen, Ltd., Derwent Foundry, Constitution Hill, Birmingham.
Vauxhall and West Hydraulic Engineering Co., Ltd., 23, College Hill, London, E.C.
H. W. Ward & Co., Lionel Street, Birmingham.
T. W. Ward, Albion Works, Sheffield.
West Hydraulic Engineering Co. (see Vauxhall and West Hydraulic Engineering Co. Ltd.), 23, College Hill, London, E.C.
Winn, Charles. & Co., St. Thomas Works, Birmingham.
Yorkshire Machine Tool and Engineering Works, Liversedge, Yorks.

Machinery Merchants.
Greenwood, Thomas, Waterside, Halifax.

Marks.
Pryor, Edward, & Son, 68, West Street, Sheffield.

Metals.
Delta Metal Co., Ltd., East Greenwich, London, S.E.
Magnolia Anti-Friction Metal Co., Ltd., of Great Britain, 49, Queen Victoria Street, London, E.C.
Phosphor Bronze Co., Ltd., Southwark, London, S.E.

Metals (Perforated).
Brown, Andrew, & Co., 110, Cannon Street, London, E.C.
Méguin, Fr., & Co., Ltd., Engineering Works, Dillingen-on-Saar.
Staniar, John, & Co., Manchester Wire Works, Manchester.

Mining Drill Steel.
Flockton, Tompkin, & Co., Ltd., Newhall Steel Works, Sheffield.

Office Appliances.
Davis, John, & Son, Ltd., 30, All Saints' Works, Derby.
Halden & Co., J., 8, Albert Square, Manchester.
Hall & Co., B. J., 39, Victoria Street, London, S.W.
Inglesant, T., & Sons, Ltd., Atlas House, Leicester.
Lyle Co., Ltd., Harrison Street, Gray's Inn Road, London, W.C.
Rockwell-Wabash Co., Ltd., 69, Milton Street, London, E.C.
Shannon, Ltd., Ropemaker Street, London, E.C.
Trading and Manufacturing Co., Ltd., Temple Bar House, Fleet Street, London, E.C.

Oils, &c.
Blumann and Stern, Ltd., Plough Bridge, Deptford, London, S.E.

Oil Filters and Cabinets.
Valor Co., Ltd., Rocky Lane, Aston Cross Birmingham.

Packing.
Beldam Packing & Rubber Co., 93-94, Gracechurch Street, London, E.C.
Lancaster & Tonge, Ltd., Pendleton, Manchester.
Redfern & Co., S., Swan Lane, New Brown Street, Manchester.
Quaker City Rubber Co., Coronation House, Lloyd's Avenue, E.C.
United States Metallic Packing Co., Ltd., Bradford,

Paper.
Lepard & Smiths, Ltd., 29, King Street, Covent Garden, London, W

Patent Agent.
Lorrain, J. G., M.I.E.E., M.I.Mech.E,, Norfolk House, Norfolk Street, - Strand, London, W.C.

PAGE'S WEEKLY Miscellaneous

TEMPERATURES from -200° C. to 8,000° C.

[illegible]

DIRECTLY READ without CALCULATION

[illegible] MEANS [illegible]

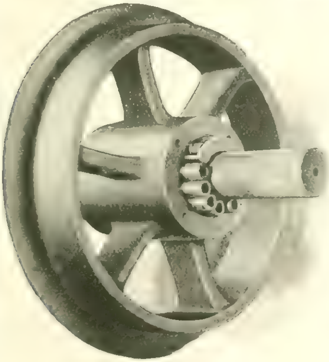
OUR THERMOMETRIC OUTFITS.

In the illustration [illegible] labourer is seen taking the temperature of the **Hot Blast** at the Works of the **Cargo Fleet Iron Co., Ltd., of Middlesbrough, England.**

THERMOMETERS, TEMPERATURE INDICATORS, AND CONTINUOUS TEMPERATURE RECORDERS FOR ALL TECHNICAL REQUIREMENTS.

[illegible] 25 P[illegible] [illegible] ...ed [illegible]

THE CAMBRIDGE SCIENTIFIC
INSTRUMENT COMPANY, LTD.,
CAMBRIDGE, ENGLAND.



HYATT FLEXIBLE ROLLERS.

[illegible] to the Wheels or Axles [illegible] Trucks [illegible] save **33 per cent. of power.**

[illegible] little attention and cost [illegible] on [illegible]

Hyatt Roller Bearing Co.,
47, Victoria Street, LONDON, S.W.

DON'T BUY AN OIL ENGINE

until you have obtained
particulars of the [illegible]

PATENT OIL ENGINE

[illegible]

BROWN & MAY,
LIMITED,
DEVIZES.

The Best and Simplest on the Market.

Catalogue and Testimonials on application

AGENTS WANTED.

Buyers' Directory—(*Continued*).

Photo Copying Frames.
J. Halden & Co., 8, Albert Square, Manchester.
B. J. Hall & Co., 39, Victoria Street, London, S.W.

Photographic Apparatus.
Marion & Co., Ltd., 22 and 23, Soho Square, London, W.

Pinch Bars.
Samson & Co., Garforth, near Leeds.

Pipe Wrenches (Chain).
Williams, J. H., & Co., Brooklyn, New York, U.S.A.

Pistons.
Lancaster & Tonge, Ltd., Pendleton, Manchester.

Planished Sheets.
Zeitz & Co., 21, Lime Street, London, E.C.

Pneumatic Tools.
Consolidated Pneumatic Tool Co., Ltd., Palace Chambers, 9, Bridge Street, Westminster, S.W.

Porcelain.
Gustav Richter, Charlottenburg, near Berlin, Germany.

Presses (Hydraulic).
Greenwood & Batley, Albion Works, Leeds
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.

Publishers.
Charles Griffin & Co., Ltd., Exeter Street, Strand, London, W.C.
Spon, E. and F. N., 125, Strand, W.C.
New Zealand Mines Record, Wellington, New Zealand.

Pulley Blocks.
Kramos Ltd., Locksbrook Engineering Works, Bath.

Pumps and Pumping Machinery.
Drum Engineering Co., 33, Brook Street, Bradford.
Enke, Carl, Schkeuditz Leipzig, Germany.
Fraser & Chalmers, Ltd., 3, London Wall Buildings, London, E.C.
J. P. Hall & Sons, Ltd., Peterborough.
Hathorn, Davey & Co., Ltd., Leeds, England.
Positive Rotary Pumps, Ltd., 23, Northumberland Avenue, London, W.C.

Radial Drilling Machines.
Asquith, William, Ltd., Well Road Works, Halifax.
Greenwood & Batley, Albion Works, Leeds
Mitchell, D., & Co., Ltd., Parsonage Works, Keighley
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne
Northern Engineering Co. (1900), Ltd., King Cross, near Halifax.
Swift, George, Clarence Ironworks, Halifax.

Rails.
Wm. Firth, Ltd., Leeds.

Railway and Tramway Fastenings.
Bayliss, Jones & Bayliss, Ltd., Monmore Green, Wolverhampton.

Riveted Work.
E. A. Keep, Jaxon & Co., Forward Works, Barn Street, Birmingham.

Roller Bearings.
Hyatt Roller Bearing Co., 47, Victoria Street, London, S.W.

Roofs.
D. Anderson & Son, Ltd., Lagan Felt Works, Belfast.
C[illegible] & Co., Ltd., Hunslet, Leeds.
Head, Wrightson & Co., Ltd., Thornaby-on-Tees.
McLean & [illegible], Ltd., Newtownards Road, Belfast.
[illegible] Howes & Co., Ltd., Sheffield.

Ropeways (Aerial).
Bullivant & Co., Ltd., 72, Mark Lane, London, E.C.
[illegible]

Scientific Instruments.
Cambridge Scientific Instrument Co., Ltd., Cambridge.

Shearing and Punching Machines.
Buckley, Saml., St. Paul's Square, Birmingham.

Slotting Machines.
Noble & Lund, Ltd., Felling-on-Tyne.
Swift, George, Clarence Ironworks, Halifax.

Spanners.
Williams, J. H., & Co., Brooklyn, New York, U.S.A.

Stampings.
Thomas Smith & Sons of Saltley, Ltd., Birmingham.
Williams, J. H., & Co., Brooklyn, New York, U.S.A.

Stamps (Rubber).
Rubber Stamp Co., 1 & 2, Holborn Buildings, Broad Street Corner, Birmingham.

Stamps (Metal).
Edward Pryor & Son, 68, West Street, Sheffield.

Steam Traps.
Lancaster & Tonge, Ltd., Pendleton, Manchester.

Steam Wagons.
Thornycroft & Co., Ltd., J. I., Chiswick, London, W.
Yorkshire Patent Steam Wagon Co., Pepper Road, Hunslet, Leeds.

Steel Structures.
[illegible] & Co., Ltd., Stockton-on-Tees.
C[illegible], Son & Co., Ltd., Hunslet, Leeds.

Steel Tools.
Buckley, Saml. St. Paul's Square, Birmingham.
Pratt & Whitney Co., 23-25, Victoria Street, London, S.W.

Steel (Tool Steel).
Buckley, Saml., St. Paul's Square, Birmingham.
[illegible], Ltd., [illegible], Sheffield.

Stokers.
Ed. Bennis & Co., Ltd., Bolton, Lancs.

Stone Breakers.
S. Pegg & Son, Alexander Street, Leicester.

Superheaters.
A. Bolton & Co., 40, Deansgate, Manchester.

Testing Machines.
Denison, Saml., & Son, Ltd., Hunslet Moor, near Leeds.

Time Recorders.
Howard Bros., 40, Basnett Street, Liverpool, and 100b, Queen Victoria Street, London, E.C.

Tubes.
Thomas Piggott & Co., Ltd., Spring Hill, Birmingham.
Tubes, Ltd., Birmingham.

Turbines.
Greenwood & Batley, Albion Works, Leeds.
S. Howes Co., 64, Mark Lane, London, E.C.

Typewriters.
Empire Typewriter Co., 77, Queen Victoria Street, London, E.C.
Yost Typewriter Co., 50, Holborn Viaduct, London, E.C.

Valves.
Holmes & Co., W. C., Huddersfield.
Hopkinson, J. & Co., Ltd., Britannia Works, Huddersfield.
Hunt & Mitton, Crown Brass Works, Oozells Street North, Birmingham.
Scotch and Irish Oxygen Co., Ltd., Rosehill Works, Glasgow.
Shaw, Joseph, Albert Works, Huddersfield.
Winn, Charles, & Co., St. Thomas Works, Birmingham.

Ventilating Appliances.
Matthews & Yates, Ltd., Swinton, Manchester.

Water Softeners and Purifiers.
Lassen & Hjort, [illegible] Queen [illegible] Street, London, E.C.

Wagons—Steam.
Thornycroft & Co., Ltd., J. I., Chiswick, London, W.
Yorkshire Patent Steam Wagon Co., Pepper Road, Hunslet, Leeds.

Weighing Apparatus.
W. & T. Avery, Ltd., Soho Foundry, Birmingham, England.
Denison, Saml., & Son, Ltd., Hunslet Moor, near Leeds.

Wells Light.
A. C. Wells & Co., 100A, Midland Road, St. Pancras, London, N.W.

Wire Ropes.
Bullivant & Co., Ltd., 72, Mark Lane, London, E.C.

Wire Working Machinery.
Ed. [illegible], 8, Shakespeare Street, Manchester.

"Woodite."
"Woodite" Company, Mitcham, Surrey.

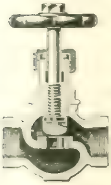
PAGE'S WEEKLY Miscellaneous

This picture represents an Electrical Engineering Works in Yorkshire, which is specially laid out for the manufacture of Dynamos, Motors, Switches and Switchboards. Everything is of the best and prices are the lowest possible, consistent with best material and workmanship.

Note the Name and Address:

T. W. BROADBENT,
Victoria Electrical Works,
EAST PARADE, HUDDERSFIELD.

The "SHAW" Patent Steam Valves . .



With Renewable Seats, Interchangeable Concentric Valve, Compound Packing to Spindle, Special Metal, and High-Class Workmanship.

The "SHAW" Patent Parallel Slide Valve is the Acme of Simplicity and Durability.

Try Them! Sent on Approval.

☞ *Write for particulars of [illegible] Separators for High Pressure Steam.*

JOSEPH SHAW. B Dept., Albert Works HUDDERSFIELD.

BUYING IS IMPORTANT.

PLACE ORDER *AFTER* YOU CALL UP

75

CENTRAL.
4 LINES
[illegible]
SERVICE

4 DIRECT
LINES TO WORKS

MOTORS
FLAME LAMPS
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INSTRUMENTS
VULCANISED WIRES
TELEGRAPH STORES
PAPER CABLES
ARC LAMPS.

JOHNSON & PHILLIPS, Ltd.
OLD CHARLTON KENT.

"VALOR" PATENT WASTE OIL FILTER

BEST AND MOST EFFECTIVE IN THE UNITED KINGDOM.

For thoroughly cleansing dirty oil so that it can be re-used

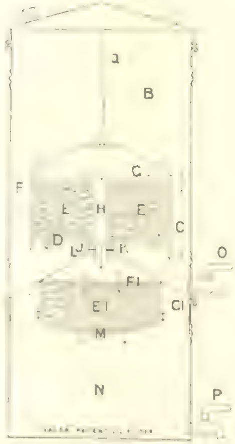
NO CHANCE FOR ARGUMENT
TO YOUR PROFIT AND ADVANTAGE

It saves your oil. It saves your money.
WHAT MORE DO YOU WANT?

Use the "Valor" Patent Oil Filter which will Repay its Initial Cost in a few weeks.

Cases Free and Carriage Paid to any Railway Station in England and Wales.

No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	39
2	[illegible]	[illegible]	[illegible]	[illegible]	46 6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	50
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	75
[illegible]	15	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



PLEASE ADDRESS IN FULL—

THE VALOR COMPANY, Ltd., Oil Filter Works, ASTON CROSS **BIRMINGHAM.**

PAGE'S WEEKLY Machine Tools

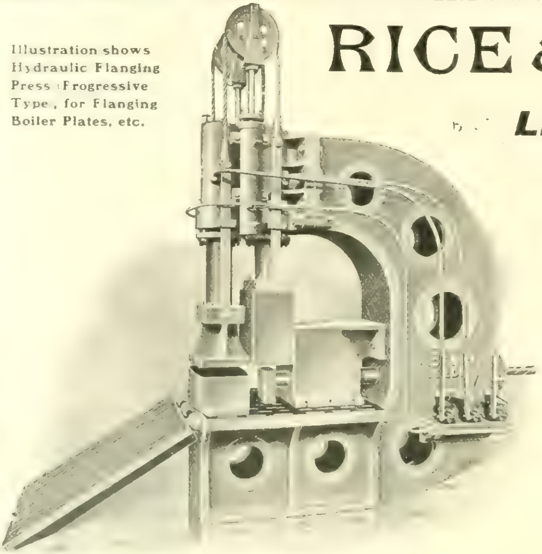


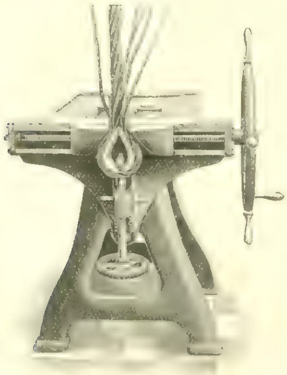
Illustration shows Hydraulic Flanging Press (Progressive Type), for Flanging Boiler Plates, etc.

RICE & CO. (Leeds),
LIMITED,
LEEDS,
ENGLAND.

HYDRAULIC

Riveters,	Lifts,
Presses,	Pumps,
Cranes,	Accumulators,
Punches,	Intensifiers,
Shears,	Valves,
Hoists,	&c., &c.

[illegible]
[illegible] Press, Leeds.
Telephone No. [illegible]



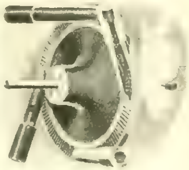
Cable Bending and Splicing Vise.

SEND FOR DESCRIPTION.

J. PARKINSON & SON
SHIPLEY, ENGLAND.

Cables, "TEMPLES, SHIPLEY" Code: A B C 5th Edition

GREENWOOD & BATLEY, Ld.
LEEDS.



Machine Tools.

Dynamos & Motors.

De Laval's Patent
Steam Turbines.

MACHINE TOOLS,
Special & General

For Engineers, Shipbuilders, Boiler Makers, Girder Makers, and Bridge Builders.

G. F. SMITH,
LIMITED,
South Parade,
HALIFAX.

Telegrams: "[illegible]," Halifax.

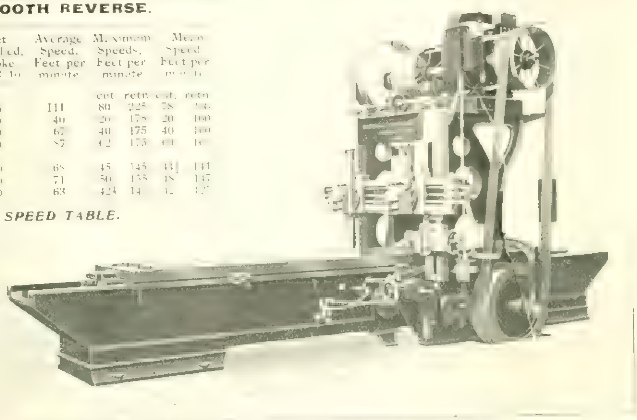
PAGE'S WEEKLY Machine Tools

The Latest Planer Practice comprises

1. VARIABLE SPEEDS ON THE CUT.
2. CONSTANT HIGH SPEED ON THE RETURN.
3. PROMPT BUT SMOOTH REVERSE.

[illegible] Planer	Length of stroke		Time of 10 cycles.		Feet travelled. Stroke × 2 × 10	Average Speed. Feet per minute	Maximum Speeds. Feet per minute		Mean Speed Feet per minute	
in. in. ft.	ft	in	m.	sec			cut	retn	cut.	retn
[illegible] 24 × 6	6	3½	1	8	126	111	80	225	78	[illegible]
[illegible] 36 × 12	12	[illegible]	6	0	240	40	20	175	20	160
[illegible] 3 speed	12	0	3	34	240	67	40	175	40	160
[illegible] for [illegible]	12	[illegible]	2	46	240	87	42	175	[illegible]	[illegible]
[illegible] 42 × 2[illegible]	22	6	6	39	450	68	45	145	44	141
[illegible] 42 × 14	14	[illegible]	3	56	280	71	50	155	48	147
[illegible] 60 × 12	13	0	4	8	260	63	42½	14[illegible]	4[illegible]	12[illegible]

THE BATEMAN SPEED TABLE.



36 in × 36 in × 12 ft patent HIGH SPEED PLANER, with Three Speeds on the cut 20, 40 and 60 ft per min. and constant return speed [illegible] ft per min.

[illegible] your planers and compare with the above speeds. Then calculate what you lose yearly by using old-fashioned [illegible], and write to us for our catalogue.

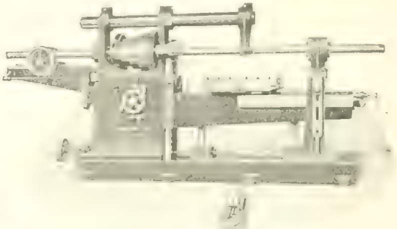
Address--

B. A., BATEMAN'S MACHINE TOOL CO., LTD., Balm Road, LEEDS, ENG.

POWERFUL, DURABLE, ACCURATE.

These are essential qualifications in machines of the type illustrated. Our make complies with these requirements, and in addition embodies all the most advanced time and labour saving features.

COMBINED HORIZONTAL DRILLING, BORING, FACING, AND MILLING MACHINES . . .



Large range of speeds and feed.
Tables self acting in all traverses.
Strong and rigid for high speeds.
Cover a very large range, and various classes of work.

Send for descriptive Booklet, BI.

CONTRACTORS to the ADMIRALTY, WAR OFFICE, Etc.

WILLIAM ASQUITH, LTD.,

SPECIALISTS in HIGH SPEED DRILLING and BORING MACHINES.

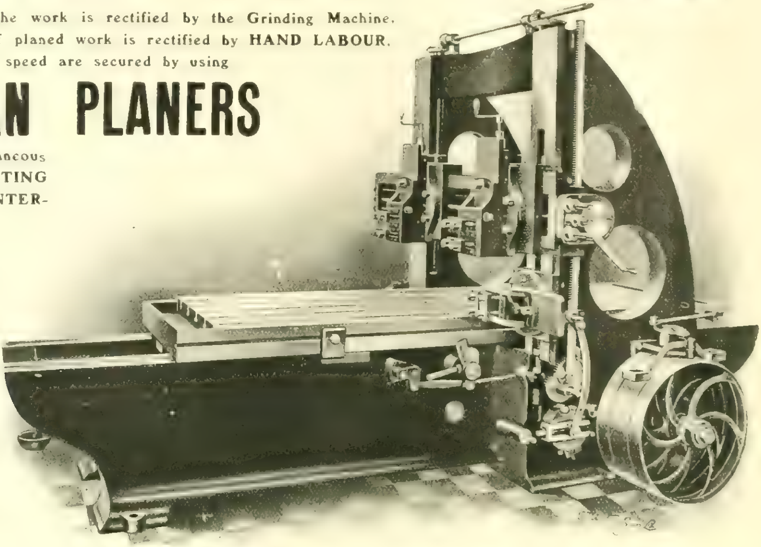
Well Road Works, HALIFAX, England.

PAGE'S WEEKLY Machine Tools

Inaccuracy of lathe work is rectified by the Grinding Machine, and inaccuracy of planed work is rectified by **HAND LABOUR**, but accuracy and speed are secured by using

REDMAN PLANERS

with their instantaneous change **FOUR CUTTING SPEED COUNTERSHAFTS.**



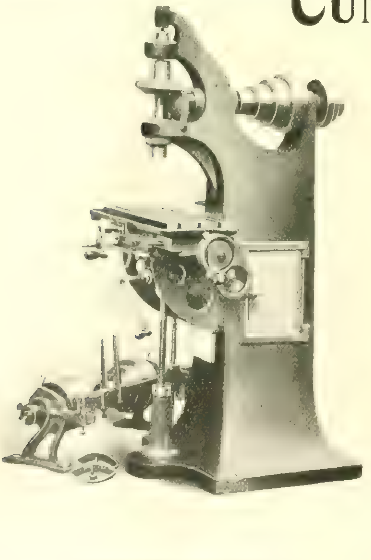
Ask specially for Planing Machine Catalogue.

C. REDMAN & SONS, Dunkirk, Halifax, ENGLAND.

CUNLIFFE & CROOM, Ltd.

Broughton Lane,
MANCHESTER,
ENGLAND.

Showroom :—
66, Victoria Street,
Manchester.



A Size Vertical Milling Machines.

VERTICAL MILLING MACHINE.

AUTOMATIC FEED.

AUTOMATIC TRIP.

SPECIFICATION.

A size, as illustrated.

Size of Table 19 in × 8

Traverses :

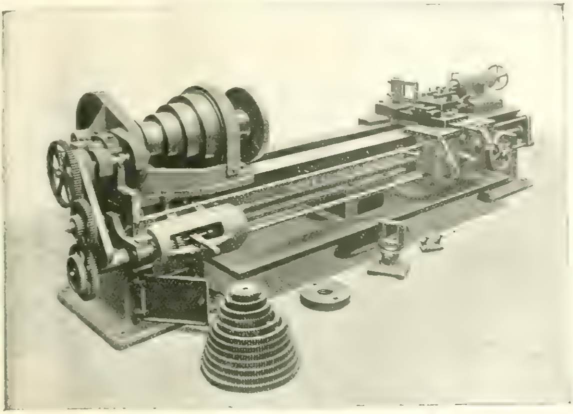
Longitudinal, by hand	5
Transverse, Automatic	12
Vertical, by hand	12

Code word, "Fire."

Price, as illustrated,	**£40**
Extra for Plain Circular Table	**£8**

Approx. weight, 10 cwt.

PAGE'S WEEKLY Machine Tools



WE MAKE
HIGH-SPEED
LATHES
A Speciality.

"ACCURATE."
"DURABLE."
"POWERFUL."
8½ in., 10 in., and 12 in.
Centres.

REASONABLE IN PRICE.
UNEQUALLED IN POWER.

Send us your
Inquiries.

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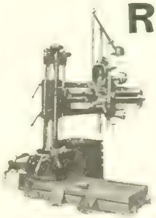
FELLING-ON-TYNE.

Dean, Smith, & Grace, LTD.,
Lathe Manufacturers,
Established 1865.
KEIGHLEY.

WRITE FOR CATALOGUE.

See Our Advertisement next Week.

HIGH-CLASS LATHES
[illegible]
RADIAL DRILLS.



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D. MITCHELL & CO., Ltd.
Parsonage Works, KEIGHLEY.

[illegible]

On War Office and India Office Lists.

FRIED. KRUPP A.-G. GRUSONWERK, Magdeburg-Buckau.

Complete Machinery for

Cable Works,
Hemp & Wire Roperies,
India Rubber, Gutta Percha,
Linoleum & Celluloid Factories.

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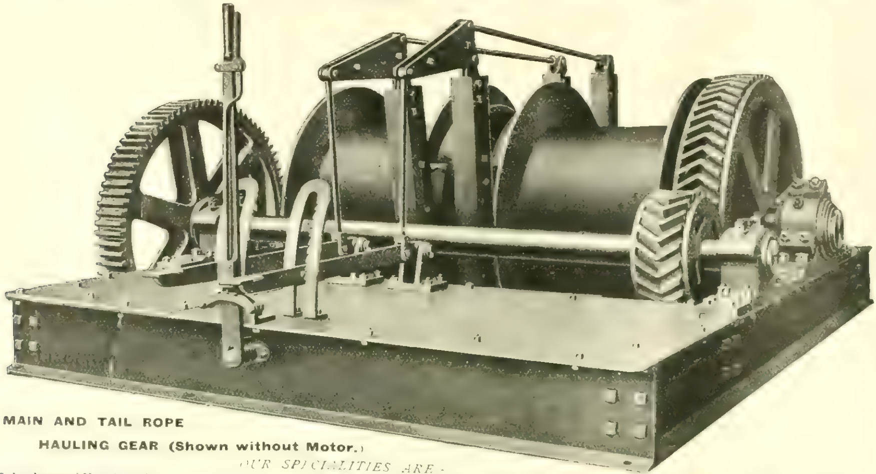
W. STAMM, 25, College Hill,
Cannon Street, London, E.C.

PAGE'S WEEKLY Gears, &c.

Electric Hoisting and Hauling Gears.



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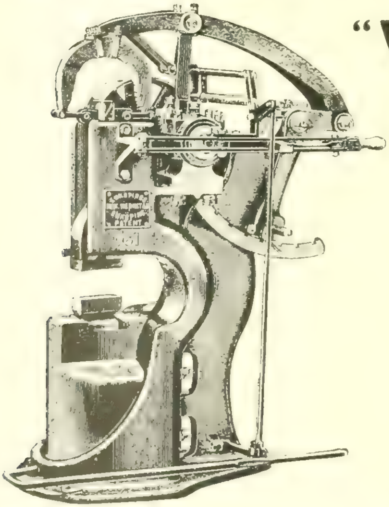
HAULING GEAR (Shown without Motor.)

OUR SPECIALITIES ARE -

Telephone: No. 208 Aston.
Telegrams: "Hauling, Birmingham."

Haulage and **Hoisting** for all purposes; also **Pumping.**

M. B. WILD & CO., ARGYLE STREET, NECHELLS, **BIRMINGHAM.**



THE . .

"VULKANUS"

Spring Power Hammer.

The most practical, easily managed, adaptable, and durable spring power hammer in existence.
The "Vulcanus" forges fast and well.
It can be used both for heavy and small forgings.
It is very suitable for welding.
It is easy to erect and easy to manage.
Takes up but little room.
Great striking-power in connection with little motive power.

HUNDREDS IN USE.

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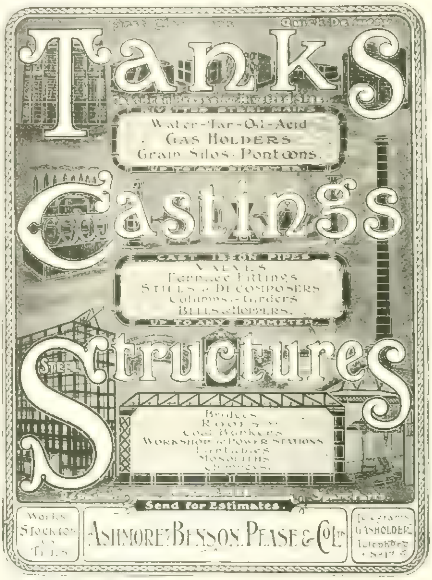
CLAYTON, SON & Co., LTD.
HUNSLET, LEEDS,
MAKERS OF THE
LARGEST STEEL TANK
AND THE
LARGEST GASHOLDER
IN THE WORLD.

ROOFING,
CONSTRUCTURAL
STEEL WORK,
PETROLEUM TANKS.

Wires:— "Gas, Leeds."
London Office:— 60, Queen Victoria Street.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Water-Tar-Oil-Acid
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Up to any Diameter
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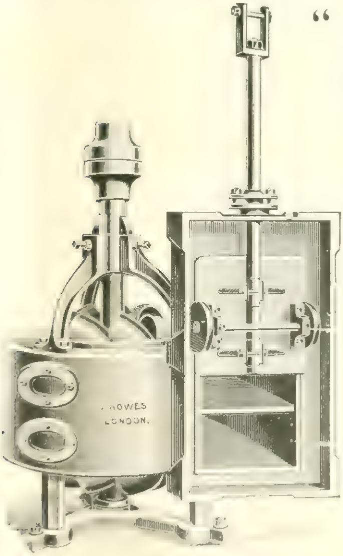

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Pelton Wheels & Water Motors.

CHEAPEST TO ERECT, FIX, AND MAINTAIN.
FEWEST WORKING PARTS OF ANY TURBINES.

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THE S. HOWES CO.,

Manufacturers of Special Machines for Flour, Stamp, Corn and Cereal Mills.

Coffee and Rice Plantation and Milling Machinery.

Saw-Dust, Bark, Cement, and Plaster Packers.

Over Fifty Years' Experience. Government Contractors.

Telegrams "BARBEAU, LONDON." Telephone: 1924 Avenue

64, MARK LANE, LONDON, England.

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OLDEST AND LARGEST FACTORY FOR THE CONSTRUCTION OF

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Best and cheapest medium of transportation for all kinds of material for any distance and within factories.

All topographical difficulties overcome by our Patent Jaw-Grip Coupling Apparatus.

"Automat."

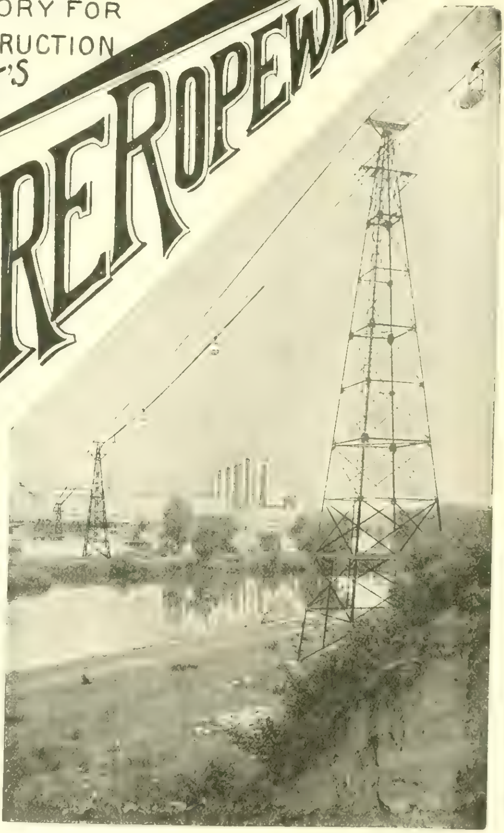
We have built plants with gradients of 1 : 1, and spans of over 1,000 metres.

First-class references from first-rate houses.

More than 1,600 Plants were constructed by us, some of a length of 34 kilometres.

30 Years' Experience.

Gold Medals. Highest Awards.



Wire-Ropeway executed for Sucreries Centrales de Wanze Soc. Anomyme, Wanze (Belg.).

Special Department for the Construction of

HOISTING & CONVEYING MACHINES, CRANES.

PAGE'S WEEKLY Time Recorders

EMPLOYERS OF LABOUR

Can save at least 5 % ON THEIR WAGES BILL, and thousands of employers do so by the use of the

"Dey" Time Registers

which are automatic machines for registering the hour and minute at which Employees start and finish work,

and, with the New Attachment provides, in addition to the weekly time and wages sheets, the CARD SYSTEM for COST KEEPING.

The "DEY" combines on **THE ONE MACHINE** the good points of all other Automatic Time Recorders on the market.

They are of British Manufacture Throughout.

They are absolutely the best Time Recorders in the World.

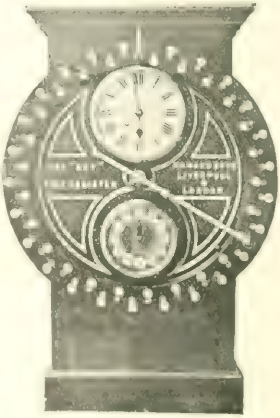
They are the cheapest up-to-date machine on the market.

They are guaranteed perfect in every detail.

THEY COMPEL PUNCTUALITY.

The "Dey" time and wages sheets combined do away with time books, wages books, and save 90 % of clerical work. They are adaptable to every requirement, no matter bow complicated.

A firm using 15 machines writes : "We shall be sorry when we change the boiler-shop machine, as it was one of [illegible] and has had the roughest usage together with the maximum of [illegible] and it has gone on working the whole time [illegible] When it goes to you for repairs, it will be the first time it has been in the infirmary."



Full particulars from the Patentees and Manufacturers

HOWARD BROS.,

40, Paradise Street, LIVERPOOL.

Telegraphic Address: "Sonnez, Liverpool." [illegible]

London Offices : 100b, Queen Victoria Street, E.C.

Telegraphic Address: "Constable, London." [illegible]

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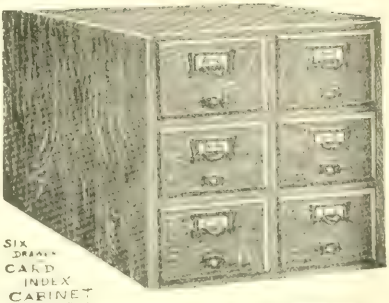

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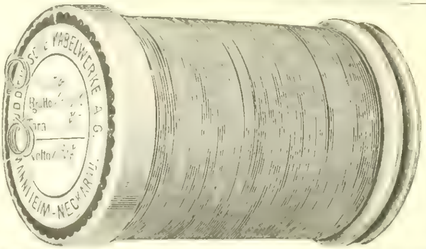

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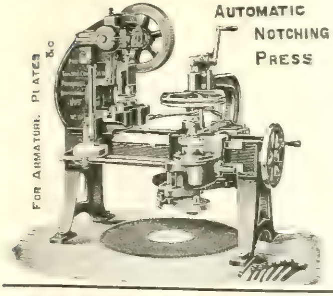

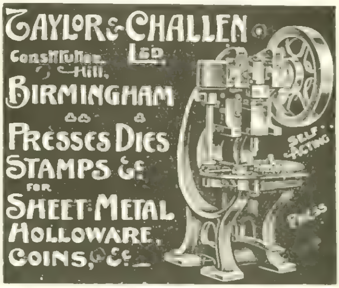
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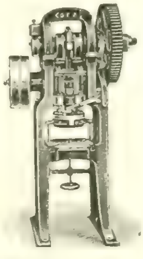

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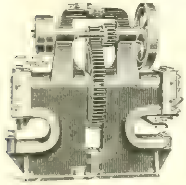

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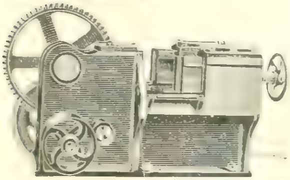

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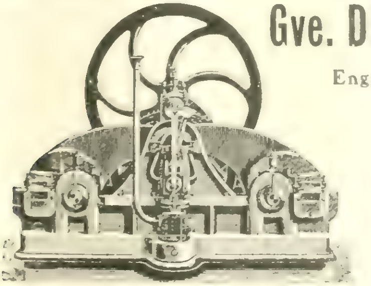

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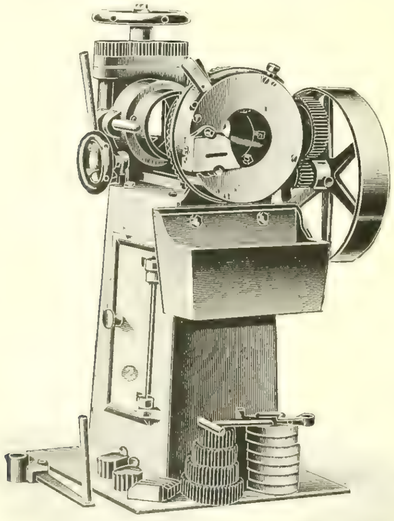

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DAVIDGE PAGE, F.C.S., F.G.S., M.I.M.E., [illegible]

VOL. VIII   LONDON, FRIDAY, MARCH 2, 1906   No. 77.

THE OFFICES OF "PAGE'S WEEKLY,"
Wednesday evening.

THE new volumes of the Royal Commission on London Traffic show that the late Charles Tyson Yerkes by no means overestimated the possibilities of London for the exploitation of traffic. Within a circle of ten miles diameter, having its centre at Charing Cross, there is a population of 4,88[illegible] persons. If we increase the diameter of this circle to twenty miles, we include 6,340,958 persons, while an extension to thirty miles would give us 6,[illegible],284 persons, and a circle of forty miles diameter would include 7,003,924. There is thus within twenty miles radius of Charing Cross a population equal to one-sixth of the total population of the British Isles, and one-fourth of the total population of England and Wales—almost as many people as in Scotland and Ireland together. The new volumes (Nos. V. and VI.—contain about 100 plans, diagrams, and drawings, selected from those furnished by witnesses during the course of the inquiry) not including American and Continental witnesses, and others specially prepared by the Commission. The plans and diagrams furnished by witnesses in the United States and abroad will be published as part of volume IV. The remainder of the plans and diagrams now in the Commission's possession are being preserved to form the stock-in trade of the new Traffic Board [illegible] London, and for the sake of the pr[illegible] railways as well as the London public, the sooner this authority comes into operation the better. There is now only one further volume of the Traffic Commission report to be issued—Volume IV.—containing the evidence taken by the Commission in the United States and on the Continent of Europe. This will be ready for publication in about six weeks. The work is literally of a monumental nature, and its preparation reflects considerable credit upon Mr. Lynden Macassey, secretary to the Commission, and Mr. R. B. Dunwoody, the engineer.

[illegible]

The continuous day and night and Sunday telegraphic service in all towns with more than 50,000 inhabitants, dreamt of by the Associated Chambers of Commerce, is not at present likely to be realised. In expressing his disagreement with the proposal, the Postmaster General lays stress upon the fact that it was also brought forward by the Corporation of Coventry at the Association of Municipal Corporations in September last, and was there rejected by a large majority. He naturally attaches great weight to the opinion of the Chambers of Commerce, but in a matter of this sort feels bound to attach a special importance to the opinion of the local governing bodies of the great towns of the kingdom. Apart from this, it appears to him that the necessity or otherwise of keeping a telegraph office continually open is not a matter to be judged from population alone, but depends on the many local conditions, which suggest that the course of each town should be considered separately on its own merits and with regard to its own special local conditions.

This view seems reasonable enough. It by no means suggests a quietus being given to a proposal made by an influential body of men who should be in a position to know what is required, but indicates rather that the problem should be attacked anew from a different point of view. In the meantime, it is worth noting that, under the present arrangements, the usual hours of attendance at the majority of telegraph offices on week-days are from 8 a.m. to 8 p.m., and at a number of towns the hours of attendance are from 7 a.m. to 9 p.m. or 10 p.m. Sunday attendance in England and Ireland is from 8 a.m. to 10 a.m., English and Irish time respectively, and in Scotland from 9 a.m. to 10 a.m. Town sub-offices in London and other large towns are not usually open on Sundays. In London the following offices are always open: G.P.O., Central; G.N.R., King's Cross (except from 1.30 to 2.30 p.m.; G.C.R., Marylebone (except 11.30 a.m. to 3.30 p.m.; G.E.R., Liverpool Street and Stratford; London Bridge (S.E. and C.R.), St. Pancras, Waterloo and Willesden Stations, and West Strand Post Office. The offices at Birmingham, Bradford (except between midnight Saturday and 8 a.m. Sunday), Brighton (except between midnight Saturday and 7 a.m. Sunday), Bristol, Cardiff Docks (ship telegrams not delivered after dark), Derby, Devonport, Dover, Exeter, Falmouth, Holyhead, Hull, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Norwich, Nottingham, Penzance, Plymouth, Portsmouth, Sheffield, and Southampton are always open; as also are those at Aberdeen, Dundee, Edinburgh, Glasgow, Belfast, Cork, Dublin, Londonderry, and Queenstown. Our obliging friend Whitaker, who gives the above information, adds that it is usually possible to get a telegram through from an office which is open to one which may, perhaps be closed for telegraphic business by payment of extra fees, viz., 1s. for the telegraphist, 1s. for the messenger. In the same way postmasters may accept telegrams after the usual hours on payment of 1s. for the postmaster, 1s. for the telegraphist, and 1s. for the messenger if it is necessary to call the telegraphist.

The report of the committee upon mechanical coal-cutting, of the North of England Institute of Mechanical Engineers, has now been completed and will doubtless be of considerable use to those who are making preliminary inquiries with a view to the establishment of coal-cutting appliances. Part I. dealt with longwall machines. Part II., which is just to hand, describes and illustrates the various heading machines, the use of which, according to the committee, appears to be extending steadily in this country. It is remarked that in a district such as the North of England, where the bord-and-pillar system of working is largely practised there is undoubtedly a field for the use of these machines, while, as a means of winning-out rapidly, and as an adjunct to longwall machines, their value has already received recognition in most of the coal-fields of the country.

According to the latest available returns, out of a total of 755 coal-cutters in use in the United Kingdom in 1904, 105 were of a type adapted for work in headings. Of these, the largest proportion were of the percussive class, and the remainder chain and rotary headers. Heading machines, therefore, formed about 21·8 per cent. of the total number in use. It may here be noted that the heading machine is practically the only machine used in America, 99·2 per cent. of the machines in use in that country in 1903, being headers and the remaining 0·8 per cent. longwall machines. The committee add that the American heading machines that have met with most favour in this country are the Ingersoll and the Jeffrey, and both of them are best adapted for work under the conditions for which they were designed, namely, high seams with good roofs.

In concluding their report the committee state that although it has not been possible to obtain statistics showing the saving, or otherwise, effected by the use of heading machines, in all the examples cited by them it appears to be established that a considerable advantage has resulted from their employment. The rapidity with which winning-places can be driven has no doubt been the chief reason for their introduction, and, in this respect the results have been of a highly satisfactory nature. There appear to be so many uses to which heading machines can be applied with advantage and economy, that their further introduction in the future may be looked for; and more extended experience will no doubt lead to still greater efficiency being obtained.

Mr. S. P. Ward, a member of the South African Association of Engineers, has contributed a memorandum to that association in which he agrees with Mr. Wager Bradford as to the possible economies to be effected by the use of mono-rails in mines, but he suggests that roller bearings would be found cheaper than ball bearings, as they would need less attention. They would be more serviceable underground and would show a satisfactory coefficient of friction. He cites the successful use of such bearings on two-wheeled hand bogies running on flat sheets in a rolling mill. It was found that two men were able to balance and trundle a 20-cwt. hot "bloom" at speed. The only trouble was that occasionally an overload would be dropped on to them, and the bogies would sit down, as it were, the axles bending. He suggests for a cast steel wheel of 8 in. or 12 in. diameter, a $1\frac{1}{2}$-in. axle pin, hub of wheel 4 in. long, and recessed to hold twelve $\frac{1}{2}$-in. diameter rollers 3 in. long. No hardening is necessary, and if fitted with a plugged oil hole the wheels will hold sufficient oil for a protracted run. The rollers used were cut from cold-rolled steel bar, the ends being merely rounded off.

In the current number of the Iron and Steel Magazine, M. Léon Guillet, discussing the future of special steels, expresses the opinion that from the point of view of mechanical construction, pearlitic steels are those which present the greater future, and it is undoubtedly in that direction that further researches should be conducted. Efforts should be made to discover some steels which, while being easily machined, possess valuable mechanical properties, after a simple thermal treatment, and in this direction vanadium introduced into certain steels appears to give extremely interesting results. He adds that gamma iron steels, although interesting in some particular cases, are too costly and have too low an elastic limit to justify a wide use. Carbide steels are only of interest in the case of very special products, such as steel balls, etc., and martensitic steels are not susceptible of any useful application; neither can graphite steels be utilised. The field of research into the properties of special steels, which a few years ago seemed so wide and unexplored, is becoming every day narrower, thanks to the modern technical methods, unless experiments be conducted with new elements, at present of interest only in the laboratory, such as borum, uranium, etc.

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London, W.C.

TELEGRAPHIC ADDRESS: "SINEWY, LONDON."
TELEPHONE No. [illegible] GERRARD.

Personal Pars.

[illegible] has promised to lay the foundation stone of the new science school at Dulwich College on Saturday, March [illegible]. The proceedings will commence in the great hall.

[illegible] in the House of Lords, on Tuesday, mentioned that the Labour Department of the Board of Trade is engaged in taking a census of wages.

LORD CROMER on Monday attained the sixty-fifth anniversary of his birth. After some years of useful work with the Royal Artillery, he became Controller-General in Egypt [illegible] years ago. The part he has played in the improvements carried out in that country and the Soudan are well known to our readers.

MR. OSWALD SANDERSON, of Hull, has been elected president of the Chamber of Shipping of the United Kingdom. At the annual meeting on the 23rd inst., Mr. F. S. Watt, the retiring chairman, said he had been in communication with Sir John Fisher on the proposed trade protection manœuvres of the Navy. The scheme would be before them shortly in a definite form and they would be asked to say individually whether they would co-operate in it. It was estimated that there would be between 300 and 400 merchant vessels under the control of the admiral.

SIR WILLIAM WHITE, in the course of a speech at the annual dinner of the Royal Corps of Naval Constructors, said they could now look back on twenty-two years of work as a constructive corps, and they were such years as had never before been known in the history of the Navy. It was pointed out to him at the commencement that the only hope for the profession in this country was that naval architects should be ranked amongst the leading engineers of the country. They were now recognised as such.

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A New Dead Length Core Machine.

The [illegible]

[illegible] position.

[illegible] Ordinary sand is then rammed into the mould, [illegible] Then [illegible]

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[illegible] although the [illegible]

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Book Notices.

A Preliminary Course in Differential and Integral Calculas."

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A Dictionary for Engineers.

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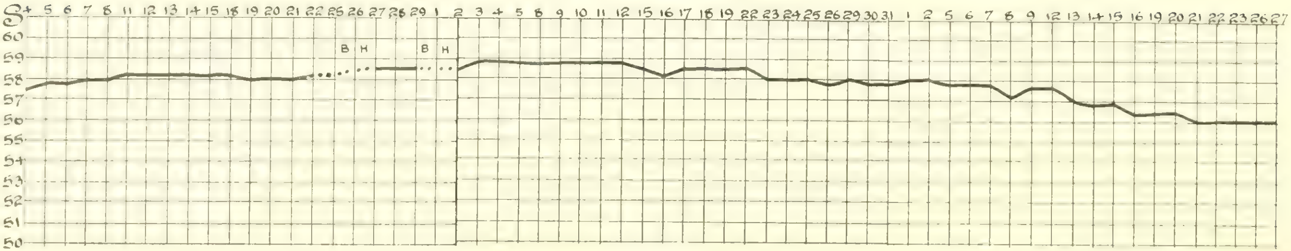
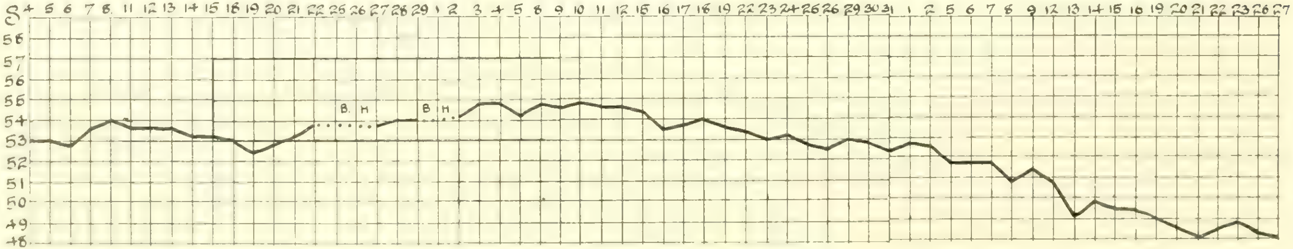
[illegible]

The Home Metal Market for the Past Three Months.

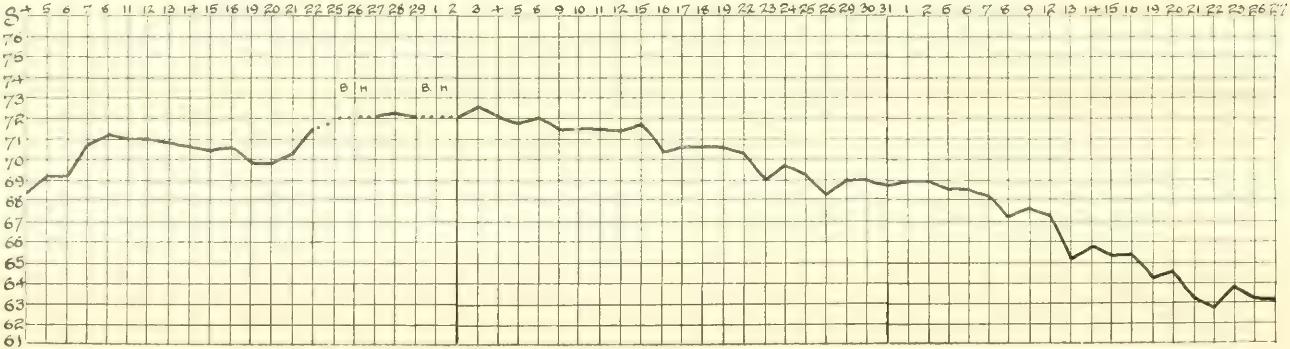
Pig Iron, Scotch:



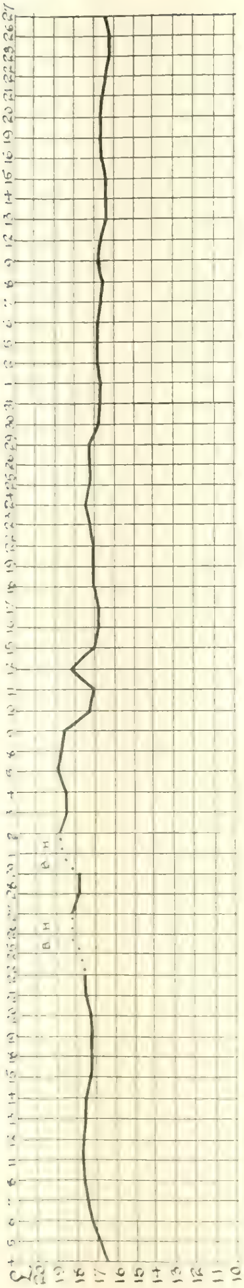
Cleveland,



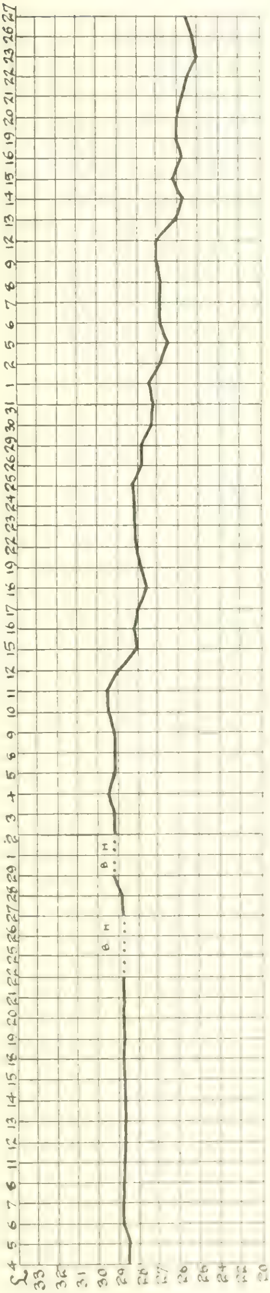
Hematite.



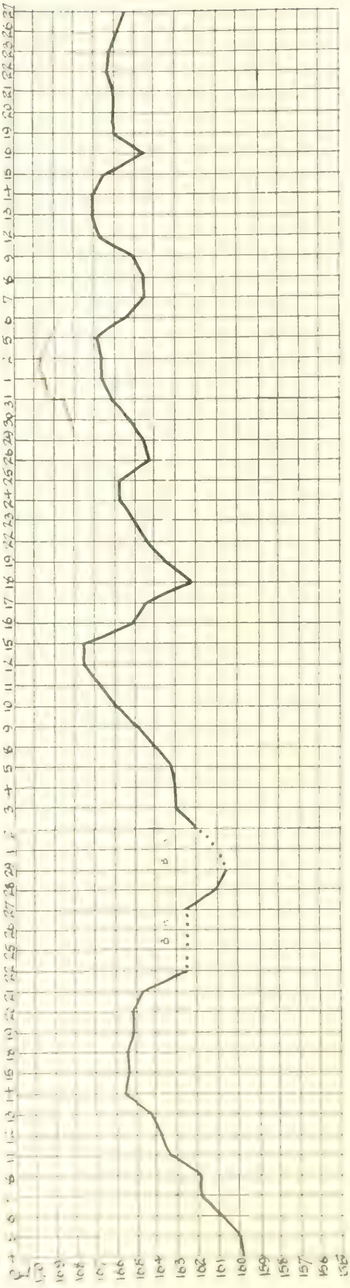
English Lead.



Spelter.

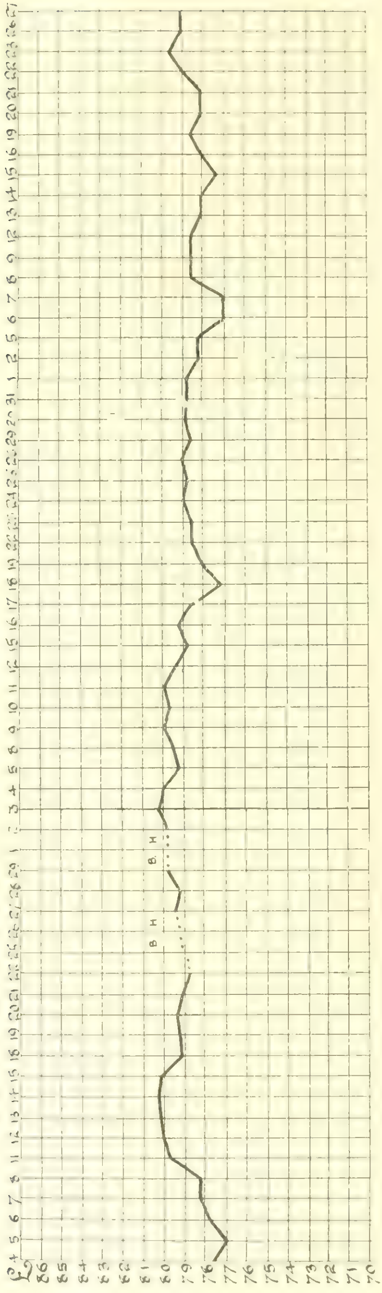


Tin.



The Home Metal Market. *Continued*

Copper.



Technical Institution News.

New Members of the Royal Society.

Among the candidates recommended for election by the Council of the Royal Society are Dr. Charles H. Lees, assistant director of the Physical Laboratories at the Victoria University, Manchester; Captain Henry Lyons, director-general of the Survey Department of Egypt; Mr. James E. Marsh, of Oxford, distinguished for his chemical researches; Mr. James Swinburne, ex-president of the Institution of Electrical Engineers; and Professor Harold A. Wilson, of the Physics Department of King's College, London.

Crane Motors.

An interesting and practical paper on this subject was read before the last meeting of the Institution of Electrical Engineers, by Mr. Claude W. Hill. The author referred to the diversity of practice in determining the size and rating of motors for crane work, the object in all users being to obtain a size of motor such that in the ordinary working of the crane its temperature rise should not exceed 75 deg. F. The method of specifying for crane motors favoured by Mr. Hill is the following:—The power which was required to lift or move the load plus the gearing losses was taken as the brake horse power of the motor. It should be specified to maintain this power on a continuous run of a quarter, half, or one hour with a temperature rise of 75 deg. F. He thinks it is not surprising that quarter-hour rated motors for crane working should fail with quite moderate overloads, and is of opinion such a motor has a very limited field of application. The half-hour motor might, he thinks, be taken as suitable for the generality of cranes having low power factors, while the one-hour motor is suitable for cranes worked moderately hard. As might be expected from the fact that half-hour motors have been found satisfactory, the power factor is low in the general run of crane work. In the design of the controller there are two objects to be attained: first the height of the current peaks must be limited to such an amount as may be convenient; and, secondly, the motor to which the controller is connected must be brought to full speed within such time as is necessary. Occasionally the controller is required to be capable of bringing the motor down to a very low speed, and when it can be conveniently arranged it is better to use a shunt motor and regenerative control.

Experience with Crane Motors.

Mr. F. W. Davis told the meeting that he had had some experience of the use of the shunt motors and speed controllers referred to by Mr. Hill, and he thought the system marked a distinct step in advance. On the new high level bridge at Newcastle he had a shunt motor and controller on a five-ton derrick crane with a [illegible] ft. jib, and the same system on a [illegible]-ton Goliath travelling crane. In girder works at Darlington it had been used on a 30-ton overhead crane for nearly three years, and had been very satisfactory. The work of the driver was much simplified, and he had complete control over the load without having to use a brake as a means of slowing it down, this being the usual practice with series motors. The acceleration was found to be steadier, and the provision of an electric brake in case or [illegible] extent of the fuse failing made the working [illegible] perfectly safe, as it was practically impossible for the crane to run away, or, what was more important, for the jib to run away when being lowered.

The Junior Institution of Engineers.

By the courtesy of Mr. A. P. Trotter, the electrical adviser to the Board of Trade, who was, however, unfortunately prevented through indisposition from receiving them as intended, the members of the above institution were enabled to pay an instructive evening visit on Monday, to the Electrical Standards Laboratory, Whitehall. Mr. Trotter is giving a paper on "Accelerations and Accelerometers" before the Institution on March 2nd, and on March 10th the Institution's annual conversazione takes place at the Westminster Palace Hotel, when one of the special features of the evening will be an exhibition of engineering and scientific models, specimens, etc.

A Paper on Boilers.

At its ordinary meeting on the 17th February, held within the New College Buildings, the Glasgow Scientific Society had submitted to it an interesting paper descriptive of "The Inglis Patent Boiler," the author being Mr. Gardiner Inglis, of Airdrie. He explained that the object of the design was to produce a boiler that could be forced in a closed stokehold to a much greater extent than the present type of cylindrical boiler, and that without damage to itself, and with economy under these conditions. The construction of the boiler which is of the single-ended marine return-tube type was described, and its distinguishing features made plain. Results of tests by independent authorities [illegible] while working at different rates of combustion were given, and the author claimed that owing to the special arrangement of the combustion chambers there was practically no smoke even when the boiler was being heavily forced, and when using Scotch coal.

Modern Warships.

Sir William White's final Cantor Lecture on this subject dealt mainly with the modern types of cruisers, torpedo [illegible] and submarines. The *M[illegible]* class of 188[illegible] [illegible] with the *Powerful* and *Terrible* of 189[illegible] [illegible] two years later, and the County class [illegible] the *Kent* was placed on the screen as an example). Later types of armoured cruisers include the *Duke of Edinburgh* and the *Minotaur*, costing about a million and a quarter sterling each, while still larger and more costly cruisers are contemplated. To show [illegible] neighbours across the Channel have been doing, illustrations were given of the French cruisers *Montcalm*, [illegible] and [illegible]. Sir William White stated that he had always been in favour of 6 in. armour and a more powerful armament, and that line had been adopted in what was known as the *D[illegible]* class. The tendency in some foreign navies to abolish the distinction between battleships and armoured cruisers, and to create a class of battle-cruisers, had not as yet been favoured by the British Admiralty. Sir William referred in conclusion to the "scouts," torpedo destroyers, and submarines, describing the last named as not [illegible] to [illegible] of greater value to weaker naval Powers. The series of lectures has proved very popular.

Talbot Steel Process.

A paper read by Mr. G. A. Wilson before the West Scotland Iron and Steel Institute gives at great length a detailed report of the working of the Talbot continuous process of steel manufacture at the Cargo Fleet Iron works, near Middlesbrough. The first furnace for the process was started in September [illegible] and in [illegible] tons of ingots were made, or nearly [illegible] tons per week. Analytical details of the first [illegible] are given, and whilst it is added that the fuel consumption has not been quite accurately obtained, [illegible] approximation brings it out at [illegible] per ton of steel. The full details of working are of interest to those connected with the iron trades.

Modern Electrical Development.

Before a meeting of the Manchester Association of Engineers, Mr. G. F. Metzger recently read a paper on "Modern Electrical Development." He pointed out that there are in Great Britain and Ireland many important municipal electrical undertakings, and some interesting particulars of these appear in the appended table.

Town	Capital	Gross Profit	Street Lighting		Motors	Traction
	£	£	[illegible]	[illegible]	H.P.	H.P.
Manchester ..	2,199,690	166,207	[illegible]3		11,0[illegible]	11,06[illegible]
[illegible]	1,718,713	13[illegible],830	181	28	5,190	3,0[illegible]
[illegible]	1,119,048	9[illegible]	814	[illegible]	6,500	
Edinburgh	845,337	[illegible],658	968	13	5,340	
[illegible]	817,304	56,7[illegible]	247	..	3,400	
Sheffield ..	804,527	4[illegible],982		..	3,600	
[illegible]	665,424	31,573		..	1,770	
[illegible]	546,277	40,692	116		3,000	[illegible]
[illegible]	522,437	[illegible]	372	3,260	1,[illegible]	2,[illegible]
St. Pancras ..	460,366	40,316	401	..	[illegible]15	
	9,699,[illegible]	733,922				
[illegible]	342,244	31,531	677	8	3,000	
[illegible]	417,272	[illegible],226	160		2,000	2,100
[illegible]	346,608	29,115	122	41	400	
Sunderland ..	304,665	10,[illegible]	165	[illegible]	5,470	3,250
[illegible]	302,933	22,700	20	42	2,700	
Hackney	273,897	20,[illegible]	293		986	
Croydon ...	271,258	2[illegible],433	410	87	300	[illegible]
[illegible]	261,548	20,141	1[illegible]	9	1,104	
[illegible]	256,821	24,138	[illegible]		[illegible]	1,500
[illegible]	245,131	[illegible]			700	3,000
	12,02[illegible]	[illegible]				

The point which Mr. Metzger emphasised was that, of the 184 central stations in Great Britain on which there has been a total capital expenditure of £28,000,000, £15,000,000 has been spent by 104 municipalities, or roughly, £[illegible] by each on the average. As the total gross profit of the whole 184 undertakings for the last year's working was £1,127,000, and two-thirds of this was credited to the ten largest, and a total of one million to the first twenty concerns, the remaining £127,000 is left to divide among the [illegible] 164 [illegible] £15,000,000 capital, or a return of less than [illegible]. But of these sixty-nine undertakings, representing [illegible] capital expenditure, [illegible] after having provided [illegible] and sinking fund out of the gross profits. Comparing [illegible] with electrical enterprise [illegible] of which there are sixty, with a total capital expenditure of £17,000,000, the gross [illegible] All but [illegible] companies, [illegible], representing a capital expenditure of [illegible] a net profit on the year's working [illegible] dividends paid to [illegible] built up.

Weekly Synopsis of Company Meetings and News.

Bolckow, Vaughan and Co., Ltd.

The directors have decided to pay to the ordinary shareholders an interim dividend for the half-year ended December 31st at the rate of 5 per cent. per annum, free of income tax.

Bow, M'Lachlan and Company.

The report of the directors states the prospects of trade for this year are very encouraging. The profit for the year is £17,313 13s. 7d., which with the balance carried forward from last year, makes the total sum at credit £20,313 9s., less interim dividend on preference shares paid September, 1905, £1,900, leaving a balance of £18,413 9s. The directors recommend a dividend (less tax) of 10 per cent. per annum on the ordinary shares for the year to December 31st, 1905, £5,700.

North British Locomotive Company.

The directors recommend a dividend on the ordinary shares of 10 per cent., free of income-tax, for the year 1905. This combination was formed in 1903 and for that year the dividend was 10 per cent., while for 1904 it was 8 per cent.

Dick, Kerr and Co., Ltd.

At a meeting on the 22nd February, the shareholders confirmed the resolution for the sub-division of the £5 preference shares and the £5 ordinary shares into shares of £1 each.

Cardiff Junction Dry Dock and Engineering.

The directors recommend a dividend of three per cent. on the ordinary shares for the year ended December 31st last, leaving a balance of £[illegible] to carry forward.

Leeds Forge Co., Ltd.

The profits for last year, including £17,547 brought forward, amounted to £[illegible]. The directors propose to place £15,000 to reserve, to write £20,000 off for depreciation, to pay a dividend of 10 per cent. (less tax) on the ordinary shares together with a bonus of 2s. 6d. per share (free of income-tax), carrying forward £23,091.

Lanarkshire Steel Company.

The annual meeting was held on Friday last at Motherwell, Mr. John Strain, chairman of the company, presiding. The Chairman, in moving the adoption of the report, said that the balance at credit of revenue account was £61,134, which meant that they had practically doubled in 1905 the profits of 1904. That would enable them to wipe out their indebtedness to the preference shareholders and pay eight per cent. to their patient ordinary shareholders. The Company's large new mills had been working most satisfactorily. Every record of output per week and per year had been broken, and he questioned even with the output from the two additional furnaces they were building that they would overtax the capacity of those mills. Their company were already the largest producer of structural steel in the kingdom, and their new furnaces would accentuate that position. The report was adopted.

W. T. Henley's Telegraph Works.

The report for the year 1905 [illegible] that the company's [illegible] during the past year the net profit has been [illegible]. The directors have transferred £5,000 to the reserve account and recommend the payment of a dividend on the ordinary shares of 15 per cent. (less income-tax). To meet the growing requirements of the business, £300,000 new debenture stock has been created. Of this stock £150,000 has been issued, and the former debenture stock has been redeemed. The construction of the Gravesend Works is approaching completion, and it is expected that manufacturing will commence there in [illegible] few weeks.

William Jessop and Sons, Ltd.

The directors recommend the payment of a dividend of 4s. per share and a bonus of [illegible] per share, both free of income-tax, which, with the interim dividend of 2s. per share paid in September last, makes 8¾d. per cent. for the year.

Crossley Brothers, Ltd.

The report of Crossley Brothers, Ltd., of the Otto Gas Engine Works, Openshaw, states that £[illegible] is available for distribution. A final dividend of [illegible] per cent. is proposed on the ordinary shares, making [illegible] per cent. for the past year, carrying £21,768 forward.

William Doxford and Sons, Ltd.

The accounts show profits of £[illegible] for the past year, and £[illegible] was brought forward. Debenture interest requires £[illegible], and £[illegible] has been added to the reserve fund and £[illegible] to the fund for equalisation of dividends. A final dividend of [illegible] per cent. is recommended on the ordinary shares, making 20 per cent. for the twelve months, and leaving £1,944 to carry forward.

Vickers, Son, and Maxim, Ltd.

The directors recommend a final dividend of 2s. per share (free of income-tax), on the ordinary shares, making [illegible] per share, or 15 per cent. for the year, carrying forward upwards of £[illegible].

Hawthorn Leslie and Co., Ltd.

The directors have decided to pay an interim dividend of [illegible] per share for the half-year ending December 31st. This is at the rate of 5 per cent. per annum.

Penarth Shipbuilding and Ship Repairing Company, Ltd.

The directors' report for the year ended December 31st, 1905, states that the severe depression which existed during the immediately preceding years has continued, and extended throughout the year under review—1905. The year's operations have resulted in a loss of £[illegible], after bringing into account the credit balance brought forward from 1904 of £576 0s. 4d., leaving a balance at the debit of revenue account of £[illegible]. The company's works and plant have been well cared for, and are in good working order.

Marbella Iron Ore Company.

[illegible] rket showed an improvement during the autumn [illegible] income-tax, which will absorb £3,750 (making [illegible] to the current year.

General Hydraulic Power.

The gross receipts of the undertakings during the [illegible] have been £123,761, as against £123,548 in 1904. After providing for interest on debentures, directors' and audit[illegible] [illegible] nd £7,250 for depreciation, the balance, including [illegible] brought forward from last account, is [illegible]. The directors propose a dividend for the yea[illegible] [illegible] having been paid, the present distribution will [illegible]

Barrow Hematite Steel.

The report states that, after deducting [illegible] for extension and improvement of works, and £10,222 for depreciation, there is a credit balance of £35,[illegible] which, with the sum brought forward, makes £36,32[illegible]. The directors recommend a dividend of 1 per cent. on the ordinary shares and an extra non-cumulative dividend of ½ per cent. on the second preference, leaving £3,092 to be carried forward.

New Companies Registered.

In the following list the registered addresses of New Companies are given whenever possible As, however, this information may be legally withheld until the actual date of commencing business, addresses are not always obtainable.

T. S. Forster and Sons, Ltd.

This company has been registered with a capital of [illegible] res, to acquire the business carried on by T. S. Forster at Copperas Bank Forge, Sunderland, and to carry [illegible] f forgemen, anchor smiths, chain makers, [illegible] n two, nor more than five. The first are, T. S. [illegible] Forster, F. Forster, and J. Ferry. T. S. [illegible] or, jointly with others, [illegible]

Llewellins and James, Ltd.

[illegible] lrawers, iron and steel cable manufa[illegible] t of every description, mill, brewery, and shop [illegible] tc., and in particular, to take over the business [illegible]

Wycliffe Foundry Company, Ltd.

[illegible]

George Harrison and Co., Ltd.

[illegible] Harrison, and [illegible] lling machinery, [illegible] No initial public issue. [illegible]

Pearson and Page, Ltd.

[illegible] No initial [illegible]

John Stevenson, Ltd.

[illegible] l, and chemical manu[illegible] ners, engineers, [illegible] ctors.

Kryptol Syndicate, Ltd.

[illegible]

Company Liens Registered.

Gloucester Railway Carriage and Wagon Company, Ltd.

[illegible] four per [illegible]

North Central Wagon Co., Ltd., Rotherham.

[illegible]

Launches of the Week.

Name of Shipbuilder and Date of Launch.	Type.	Name of Vessel.	Principal Dimensions.	Machinery, etc.	Tonnage.	I.H.P.	Estimated Speed. Knots.	Built to the order of.	Remarks.
William Gray and Co., Ltd., West Hartlepool (2[illegible])	Steel screw	[illegible]	[illegible] ft. by 40 ft. by [illegible] ft. 6½ in.	Triple expansion engines, having cylinders 21 in., 33 in. and 56 in. diameter. Central Marine Engine Works. Two steel boilers; working pressure, 180 lb.				L. H. [illegible], Copenhagen	
S. P. Austin and Son, Ltd., Sunderland (21.2.06)	Steel screw	[illegible]	...	Supplied by George Clarke, Ltd., Southwick Engine Works, Sunderland	2,200 dead weight capacity			Stephenson, Clarke and Co., London	Third vessel constructed for the same owners.
Sir Raylton Dixon and Co., Ltd., Middlesbrough		*Velasquez*	481 ft. by 59 ft. by [illegible] ft. 8 in.	Triple expansion engines by Richardsons, Westgarth and Co., Ltd. Cylinders 27 in., 46 in. and 77 in., by 60 in. stroke. One single-ended and three double-ended boilers; pressure, 200 lb.	Measurement capacity, over 10,600; dead-weight capacity, over 11,100			Lamport and Holt, Liverpool	Trial trip Feb. 20th. Designed for Brazil and River Plate trade.
Barclay, Curle and Co., Ltd., Whiteinch (24.2.06)	Large screw three deck	[illegible]	436 ft. by 54 ft. by 34 ft. 10 in.	Triple expansion engines; four large steel boilers by the builders, Stobcross Engine Works	...			British India Steam Navigation Co., Ltd.	
Swan, Hunter, Wigham Richardson, Ltd., Newcastle-on-Tyne ([illegible].2.06)	...	[illegible]	2[illegible] ft. by 26 ft.	Triple expansion engines and boilers will be supplied by the builder	..		4	Lancashire and Yorkshire Railway Co.	To run between Goole and [illegible]
Craig, Taylor and Co., Ltd., Thornaby-on-Tees (2[illegible])	Single-deck	[illegible]	[illegible] ft. by [illegible] by 25 ft. 10 in.	Engines by Blair and Co., Ltd. Two steel boilers; pressure, 180 lb.				Buenos Ayres and Pacific Railway Co., Ltd.	
[illegible], Grahame and Co., Hull (24.2.06)	Single-deck	[illegible]	...	North Eastern Marine Engineering Works will supply engines and boilers	Carries 3,1[illegible] on moderate draught			[illegible] Reed and Co., Tonsberg, Norway	
Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne (24.2.06)		[illegible]	272 ft. by 4[illegible] ft. by [illegible]	Do.	[illegible] dead weight		—	Houlder, Middleton and Co., London	For the Reliance Shipping Co., Ltd.
Wood, Skinner and Co., Ltd., Newcastle-on-Tyne (24.2.06)	Raised quarter deck, rigged as a two-masted schooner	[illegible]		Machinery by John Dickinson and Sons, Ltd.				[illegible] Hedberg, Malmo, Sweden	

Launches of the Week—(*continued*).

Name of Shipbuilder and Date of Launch	Type	Name of Vessel.	Principal Dimensions.	Machinery, etc.	Tonnage.	IHP	Estimated Speed Knots.	Built to the order of.	Remarks.
Smith's Dock Co., Ltd., North Shields (23.2.06)	Awning deck	*[illegible]* ...	220 ft. by 32 ft. by 21 ft.	Engines by MacColl and Pollock, Ltd., Sunderland	...	...		Lloyd Bahia Blanca ..	For South American trading.
W. Doxford and Sons, Pallion (23.2.06)	Single decked turret	*Pen[illegible]* ...	...	...	...	...		Richard B. Chellew, Truro	
John Brown and Co., Ltd., Clyde Bank	Similar to the *St. David*	*St. Pa[illegible]* ..	350 ft. by 41 ft. by 17 ft. 8 in.	Three Parsons' steam turbines, eight single ended boilers, with Howden's forced draught	..	.	[illegible]	Fishguard and Rosslare Railways and Harbours Co.	Second of the two vessels built by John Brown and Co., for the Irish Channel Service
Ailsa Shipbuilding Co., Ltd., Troon Yard (24.2.06)		*[illegible]* ..	132 ft. by 25 ft. 9 in. by 16 ft. 6 in.	Triple expansion engines by MacColl and Co., Belfast		..		Antrim Iron Ore Co., Ltd.	.
P. McGregor and Son, Kirkintilloch	Screw tug	*P[illegible]*	...	Machinery by Fisher and Co.	...	...	..	Premier Towing and Lightering Co., Ltd., Hull	
Harland and Wolff, Ltd., Belfast	Sister ship to the *Aragon*	*Amazon* .	520 ft. 6 in. by 60 ft.	.	.	...	...	Royal Mail Steam Packet Co.	South American Service
[illegible] Shipbuilding and Engineering Co., Ltd. [illegible]	Steam trawler	*G[illegible]* ..	130 ft. by 22 ft. 5 in. by 12 ft. 10 in.	Triple expansion engines; cylinders, 12½ in., 21 in. and 36 in. by 24 in. stroke	...	...	..	Moody and Kelly	For the Fleet [illegible].
Scott's Shipbuilding and Engineering Co., Ltd., Greenock ([illegible].2.06)		*[illegible]* .	[illegible] ft. by [illegible] ft. by 31 ft. 6 in.	Inverted cylinder type expansion engines. Both of the two main boilers have a heating surface of 3,000 sq. ft., and a grate area of [illegible] ft.	[illegible] gross	[illegible]		Alfred Holt and Co., Liverpool	
Harland and Wolff, Ltd., Belfast ([illegible])	Sister ship to the *[illegible]*	*G[illegible]*	[illegible] ft. by [illegible] ft.	Quadruple expansion engines on the balanced principle	[illegible] tons	...	...	[illegible] Steamship Co., Ltd.	[illegible]
William Hamilton and Co., Ltd., Port Glasgow ([illegible].2.06)		*[illegible]* ..	[illegible] ft. by [illegible] ft. by 24 ft.	Triple expansion surface condensing engines, by Muir and Houston, Glasgow	1,450 gross	...	1[illegible]	[illegible] Hernani [illegible]	[illegible] Coasting trade.
Irvine's Shipbuilding and Dry Dock Co., Ltd., West Hartlepool ([illegible])		*[illegible]*	[illegible] ft. by [illegible] ft. by [illegible] ft. [illegible] in.	Richardsons, Westgarth, triple expansion engine	...	..	...	Dampskibs [illegible]	[illegible] North and South American trade.
[illegible] Shipbuilding Co., Ltd. ([illegible])		*[illegible]*		By Muir and Houston, Ltd.	...	.		Spencer and Bauer, Ltd., Cardiff	
Workman, Clark and Co., Ltd., Belfast (27.2.06) [illegible]		*City of G[illegible]*	...	Quadruple expansion engines	[illegible],000	4,[illegible]	...	Ellerman Lines, Ltd.	Passenger and cargo trade between Glasgow, Liverpool and Calcutta.

Reports from Abroad.

Continental.

Iron and Steel Trade.

Recent reports from the Rhenish Westphalian iron and steel market show an improving position and it would seem that the majority of the iron works in that district are sold out well ahead. Owing to the scarcity of raw material English ores have been imported, but even with this assistance it is becoming difficult to meet the requirements of the trade. It is reported that the Steel Syndicate is unable to accept sales to foreign order and a further increase in prices appears probable. In the upper Silesian district the position appears to be equally satisfactory, local works being all well occupied and the trade in rolled iron being particularly good. Other active lines are girders, tubings and pipings. There is some talk of a large inquiry from America for Bessemer iron, but it is not likely that any quantity of iron will go out of the country. It is understood that a new group of furnaces are to be put down at [illegible].

The Iron Famine in Germany.

The demand for raw iron continues, and it is stated that the Siegerland Raw Iron Syndicate has been compelled to decline a contract for specular iron for America. A similar order for Bessemer iron had also to be refused. The Rhenish-Westphalian Raw Iron Syndicate has also received an American order for 30,000 metric tons of Bessemer iron, but found itself unable to accept the offer. Even the export to Holland has been stopped in consequence of the insatiable demand of the home market. Contracts to home orders have already been concluded at present prices for the whole of 1906, and in some instances, writes a correspondent, well on into next year beyond the term at which the syndicate agreement is due to expire.

Trade with the United States.

The Bill granting to the United States most-favoured nation treatment, while negotiations are proceeding for a regular treaty of commerce, was on Thursday carried in the Reichstag.

A New Waterproof Cement.

A new waterproof cement, patented in Germany, consists of a mixture of vegetable wax and caustic lime in boiling water added to unground Portland cement clinker, the whole being ground together. The formula is given as follows: To each 200 lb. of cement clinker is added a mixture of [illegible] lb. of Japan vegetable or berry wax and 1 oz. of caustic lime which has been dissolved in 14 pints of boiling water. These ingredients are thoroughly mixed and when cooled are dried and ground very fine with the cement clinker. The inventor claims that a coating of the material [illegible] in. thick placed on a [illegible] wall will render it waterproof.

Export Duty on Swedish Iron Ore.

In the Swedish Parliament Upper House on February 24th, M. Bergstroem interpellated the Minister of Foreign Affairs on the subject of Sir C. McLaren's question in the House of Commons on Wednesday with regard to the proposed export tax on Swedish iron ore. M. Bergstroem asked whether diplomatic negotiations on the matter had been opened by the British Government, and, if so, what proposals had been made. In his reply, the Minister for Foreign Affairs pointed out that Sir Henry Campbell-Bannerman, in answering the original question in the House of Commons, confined himself to saying that the Government would inquire whether the proposed duty was likely to be adopted. No diplomatic negotations had been opened from the British side, and no proposals had been made. In the Lower House, Professor Kjellen announced his intention of asking the Minister for Foreign Affairs whether an agreement existed between Sweden and any foreign Power, which would restrict her liberty in imposing an export duty on iron ore.

Italian Customs.

The alterations in the Italian Customs tariff consequent on the recent commercial treaty between Germany and Italy came into force yesterday, March 1st. Full details of the alterations in question can be obtained by those interested, on application to the Commercial Intelligence branch of the Board of Trade.

Simplon Temperatures.

A good deal of misgiving has been [illegible] expressed on the score of high temperatures in the Simplon, owing to the continued flow from the hot springs through the boring; practical tests have been made to have the matter decided in a decisive way. A thermometer was placed in the carriages of the first trial train sent through the tunnel, and this gave the following reading:—At the northern mouth of the tunnel [illegible] registered, and during the whole journey, notwithstanding that the windows were let down, the thermometer never rose higher than 14 deg., although there were times when the temperature of the rock was as high as [illegible] deg., but by means of ventilators [illegible]. These results are held to set at rest [illegible] the ventilation and atmosphere of the tunnel.

Proposed Electric Tramway.

A project which is now assuming concrete shape has for its object the construction of a [illegible] promenade extending from Ostend to Dunkirk—a distance of over forty-six miles. Over forty miles of this will be in Belgian territory, the rest in France. The promoters of the scheme have just held a preliminary meeting to discuss the scheme, and the estimated expense was put down at [illegible]. A double line of electric tramway is also proposed, the cost to be defrayed by the concessionaires.

Colonial.

Smelting by Electricity.

It is reported from Ottawa that the experiments which have been carried out, under the auspices of the Government, with the object of ascertaining whether magnetite ores can be smelted by electricity, and as to whether pig-iron can be desulphurised, have been completely successful. The process is now capable of immediate commercial [illegible], as forty tons of pig-iron have up to the present been treated and found [illegible] quality. Nickel, pig, and roasted pyrrhotite have also been produced, and it is predicted that there is a great industrial future for Canada, where ore is cheap, and the supply of water power abundant.

Destructive Works Fire.

The Inter-Colonial Railway workshops at Moncton, New Brunswick, have been destroyed by fire. The estimated loss entailed is 1,000,000 dollars, and the fire will seriously affect the efficiency of the whole railway, which is owned and operated by the Canadian Government. Almost the whole of the mechanical equipment, upon which a thousand men were employed, has been wiped out, the locomotive shops have been destroyed, and over a hundred cars have been burned. The cause of the fire is unknown.

Natal Chambers of Commerce

An endeavour is being made to institute a Congress of Natal Chambers of Commerce. The Durban Chamber of Commerce, however, suggests that instead of the temporary congress at first proposed, a permanent body should be formed. With this end in view, the Chambers of Commerce have all been communicated with, and [illegible] will appoint delegates, to meet at a place and date to be decided upon, [illegible] Associated Chambers [illegible].

A Singapore Contract.

Sir [illegible] [illegible] constructing new docks at Singapore, the amount involved being in excess of two millions sterling. The contract is in connection with the scheme under which the Government in the Straits Settlements, with the object of establishing a new naval base in the Far East, has acquired the docks of the Tanjong Pagar Company. To determine the cost of the transfer, Sir Edward [illegible], K.C., and Mr. Inglis, manager of the Great Western Railway, were appointed arbitrators for the vendors and the Colonial Government respectively, with Sir Michael Hicks-Beach, M.P., as [illegible].

Ferro-concrete Adhesion Tests.

Some interesting facts respecting the use of steel for reinforcing concrete were communicated by Professor Warren to the Royal Society of New South Wales. Some prepared bars of Bessemer steel were pulled out of concrete prisms 4 in. by [illegible] by means of a testing machine. Three sets of experiments were conducted, and with steel bars, having the natural skin on, and after forty-five days hardening in air, the adhesion was 198 lb. per square inch. With the skin removed and the steel polished, the adhesion after the same number of days in air was only 125 lb., but in water after the same length of time the adhesion was [illegible] bars being polished.

Foreign.

The Trade of the Soudan.

The Belgian Consul-General in Cairo, in a note on the trade of the Soudan, emphasises his conviction that an extensive commerce is already assured to the new port by the diversion of merchandise hitherto conveyed through Wady Halfa. The Soudanese imports in 1904 through Wady Halfa included iron and machinery to the extent of [illegible].

The Hejaz Railway.

[illegible]

Proposed Commercial Museum in China.

According to the Anglo-Japanese Gazette, the Chinese Minister of Commerce has made the [illegible] establishment of a [illegible] museum at Peking. A [illegible]tion of suitable buildings has already been [illegible], and it is intended to establish [illegible] Chinese and foreign [illegible]. It is expected that [illegible] a place for their [illegible] by an increased [illegible]. The Japanese are taking [illegible], and it is supposed [illegible] inception.

Import Duty on Machinery.

[illegible] (not [illegible] per cwt.).

United States.

Wireless Telegraphy.

The De Forest Wireless Telegraph Company claim to have transmitted a wireless telegraphic message on January [illegible] last from Manhattan Beach to the Naval Station, Colon, where it was correctly deciphered, being a distance of 2,150 miles.

Ship Subsidies Bill.

Congressional visitors at the White House report that President Roosevelt strongly favours the passage of the Ship Subsidies Bill, concerning which his attitude has hitherto been a matter of doubt.

The Panama Canal.

The President has convinced the Canal Commission of the advantages of a lock canal, but in some quarters doubt is still expressed as to whether certain engineering difficulties—changes in the river, the Culebra Cut, and the Bohio dam—can be overcome by such a scheme. The New York Times says that probably Chief Engineer Stevens and his commissioners are satisfied that they can triumph over these and all other engineering difficulties. If they are mistaken, the President and the country will have the satisfaction of discovering the mistake after a hundred millions more money has been spent. Then three or four hundred millions of additional expenditure and twenty years of work will complete a sea-level canal. By disregarding the advice of the majority of the consulting engineers, including all the foreign engineers whose advice he sought, the President has taken a line which is certainly open to criticism.

The Dry Dock Dewey.

The voyage of the dry dock *Dewey* to the Philippine Islands is being followed with great interest. It is significant that a portion of the message sent by the commander of the escort from Las Palmas, notifying arrival at that port, was suppressed. The deleted portion had reference, it is understood, to the difficulty of towing. It has been since reported that the United States warship *Tacoma* has sailed from Naples with additional towing machinery for the Canaries. The Navy Department will have to pay the Suez Canal Company a very large sum for using its waterway, and has also had to assume all costs in the event of the dock blocking up the channel. Altogether the cost to the United States of the few miles journey through the Suez Canal will amount to not less than [illegible] dollars.

Permanent Moulds from Coke.

In a paper read before the Philadelphia Foundrymen's Association, Mr. H. C. Caldwell claims that permanent moulds, suitable for casting iron, can be made out of coke, provided the latter is baked at a sufficiently high temperature. The same moulds, he states, can be used [illegible] times, and [illegible] have the advantage that they require no venting.

Important Irrigation Works.

The German Consul in Seattle [illegible] attention to numerous projected irrigation works in the Western States of America. Congress has voted over [illegible] towards the cost of irrigation, and a first instalment of [illegible] has been paid. The area to be taken in hand is [illegible] miles east of Yellowstone Park, and is 100,000 acres in extent. The work proposed includes the construction of a [illegible] dam, the Milk River [illegible] scheme, the most extensive of all [illegible] acres, the Malheur scheme [illegible] acres, in Oregon, at an estimated cost of [illegible], and the Klamath scheme for the irrigation of [illegible] acres, in the basin of the Klamath in Oregon and California.

Large Allis-Chalmers Gas Engine.

The new Crystal City Works of the Pittsburg Plate Glass Company now under construction at Crystal City, Missouri, will, when completed, occupy a unique position among industrial plants from the remarkable size of the lighting and power units installed there. This plant will be the largest of its kind in the United States, driven by electrically transmitted power, its design embodying many new features specially devised to meet production conditions. A notable feature of the power equipment for the new plant is the installation of an 1,800 b.h.p. Allis-Chalmers gas engine unit, direct connected to a 1,000-kilowatt generator. This engine is of the well-known four-cycle, double-acting, "Nuremberg" type. It is a horizontal, four-cylinder, twin tandem engine with a 42-in stroke, and a speed of 107 revolutions per minute. The unit is designed to operate from producer gas, generated from "Big Muddy," Illinois bituminous coal. All moving parts are arranged for automatic and continuous lubrication under pressure. The gas engine and alternator will be arranged to run in parallel with other units. The alternator is of the Allis-Chalmers revolving field engine type, three phase, twenty-five cycles, and mounted directly on the crank-shaft between the two engines. This unit will be installed in the same power-house with the 5,000-h.p. Allis-Chalmers engine recently purchased, and which will be recalled by visitors at the St. Louis Exposition, where it carried the entire lighting load for the illumination of buildings and grounds.

Steel Rail Production.

The production of all kinds of rails in the United States in 1905, amounted to 3,372,257 gross tons, against 2,284,711 tons in 1904, an increase of 1,087,546 tons, or 47·6 per cent. The maximum production was reached in 1905. The year of next largest production was 1903, when 2,992,477 tons were made. The increase in 1905 over 1903 amounted to 379,780 tons, or over [illegible] per cent.

"Some Recent Electrical Measuring Instruments."

By Kenelm Edgcumbe, M.I.E.E., A.M.I.C.E.

ENGINEERS do not, as a rule, fully realise what a very wide field is covered by electrical measuring instruments, and since, in these days of specialisation it is manifestly impossible for anyone to keep abreast of what is being done in every branch of the industry, it seemed to the author that a short review of the recent progress which had been made in one or two directions in the field of electrical instruments might be of interest.

Ampere Gauges.

The rapid development of the electric motor has given rise to a demand for an inexpensive and reliable ammeter, which can be installed with each machine, to enable a check to be kept on the power consumption, so that the engineer in charge can see at a glance whether his plant is being worked to the best advantage or not, and that his motors are not being overloaded, and so forth. Owing to the fluctuating nature of the load, it is, of course, essential that these instruments should be moderately dead-beat; and another point, which has hardly been sufficiently considered, is that they should be fitted in exceptionally strong and durable cases, the ordinary brass-spun cases with exposed glass fronts being quite unsuitable for the rough usage to which these meters are often subjected.

When it is mentioned that these instruments have to be sold at anything from 20s. to 25s. each, and, moreover, have usually to stand 500 volts between windings and case (often in an excessively damp and dirty situation), it will be admitted that the problem is not an altogether simple one.

There has been for some time, particularly in this country, a prejudice against the use of cast-iron cases for moving-iron instruments, on account of the errors which were often found, owing to the magnetisation of the case itself. A moment's consideration will show that so long as the ordinary solenoid movement is screwed down to an iron base without any non-magnetic [illegible], so to speak, in between, the case will become strongly magnetised, and large errors will almost certainly be introduced. There are, however, two ways of overcoming this difficulty. One consists in employing a coil whose axis lies parallel to the base instead of at right angles to it. This is the method adopted in instruments of the so-called "Universal" pattern, and has several incidental advantages. The other alternative is to leave a considerable gap between the coil and the base. This latter method is the one employed in the Everett-Edgcumbe gauge, as will be seen from the section of the instrument given in Fig. 1. The path of the lines of force passing out at the bottom of the coil is through the insulating base to the cast-iron shield and back again through the base to the cast-iron side walls or the bottom plate of the case.

So far as direct current motors are concerned, there are now several instruments which can be installed without adding appreciably to the cost of an installation, and which enable the power developed by the motors to be at once seen.

Unfortunately, in the case of alternating current plants, the matter is not so simple. The inclusion of an ammeter in the circuit can at best only afford a very rough indication of the load on the motor. This is, of course, due to the fact that an alternating current motor behaves like a choking coil, and causes the current to lag more or less behind the voltage on the motor terminals. Thus the product of

$$\frac{\text{Volts} \times \text{Amperes}}{\text{[illegible]}}$$

will always be greater than the horse-power absorbed by the motor, and moreover, the relation of one to the other varies with different makes of motor, and is further dependent on the load. In the case of a medium-size single-phase motor, the ratio of apparent power to true power would be something like 4 to 1 at light load, and [illegible] to 1 at full load. With a two- or three-phase motor, the ratio might become [illegible] to 1 and [illegible] to 1 respectively.

It is, of course, quite possible to [illegible] a particular [illegible] for each load, and to graduate the ammeter accordingly, but the graduation will only hold good for [illegible]

[illegible]

What is [illegible], graduated either in watts or in horse-power, and showing beyond dispute the actual power [illegible]

It is really only within the last few years that the scientific design of wattmeters has been fully understood and seriously taken in hand, and that the confidence of engineers in their indications has been gradually restored. It would lead the author too far were he to enter further upon this question. Sufficient to say that, whereas for laboratory and standard instruments all metal must be excluded as far as is reasonably possible, at the same time for ordinary purposes, such as for motor work, by careful design ample metal can be employed in the working parts to ensure mechanical strength, and the instrument can even be shielded by being fitted in a cast-iron case of special construction.

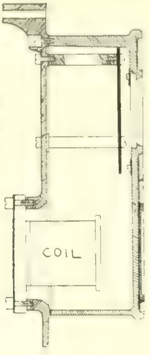


Fig. 1. Improved Ampere Gauge.

Fig. 2

Graduation of Ammeter in Horse Power (A.C.)

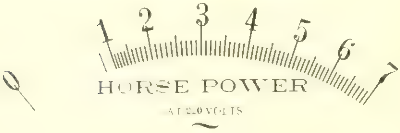
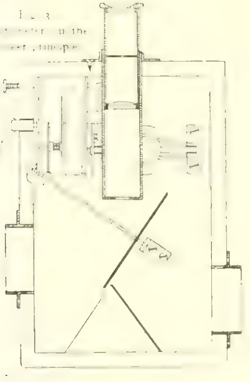


Fig. 3

Photometer on the Flicker principle.



As far as the writer is aware, only two attempts have been made to produce a cheap instrument of fair accuracy and strong mechanical construction in a cast-iron case. One of these is due to Dr. Drysdale

The other instrument alluded to is the Watt gauge of Messrs. Everett-Edgcumbe. It is constructed on the dynamometer principle, and is chiefly distinguished by its strong mechanical construction and by the fact that it is fitted in a cast-iron case. The magnetic field employed is particularly strong, so that the effects of stray fields are negligible. The instrument is air-damped, and extremely substantially made.

Photometers

Although not perhaps strictly electrical instruments, photometers are so intimately connected with electric lighting, that no apology is needed for introducing them into the present paper, more particularly as considerable progress has been made in their design during the last few years.

In all ordinary photometers, the measurement consists almost invariably in the comparison of two surfaces illuminated respectively by the two sources of light which are to be compared. The brightness of one or both of these illuminated areas is then varied until as nearly as can be judged by the eye equality of illumination has been attained. From a knowledge of the candle-power of the standard and the respective distances of the two lights from the screens, the candle-power of the other light can be at once calculated.

Of late years the "Flicker" photometer has been coming more and more into favour. The principle of this device, which was originally due to the work of Hood, Whitman, and others, is that the surfaces illuminated by the two lights to be compared are alternately presented to the observer's eye in rapid succession. If they differ to any extent in brightness, a distinct flickering is noticeable, which diminishes and eventually disappears altogether as the two illuminations are made more and more nearly equal. It is, moreover, found that a perfectly definite point of balance can be obtained, in spite of all ordinary differences of colour.

An ingenious form of "Flicker" photometer was introduced some years ago by Messrs. Simmance and Abady.

The principle of one of these latter (the Everett-Edgcumbe form) is shown diagramatically in fig. 3. Whichever form is employed it will be found that there is a particular speed of rotation which gives the maximum sensitiveness, and, as a rule, it may be said that the greater the difference of colour between the two sources of light the more rapid should be the alternations.

What is the precise physiological meaning of the existence of the flicker seems still somewhat obscure, but for all practical purposes the important point is to inquire how measurements based on this phenomenon compare with those obtained by the equality of illumination methods. After taking all the available evidence into consideration, based both on tests made by the author and by others, he can confidently say that he has never yet come across any case in which there was not complete agreement between the two methods to well within errors of observation.

It has been frequently mentioned, and with reason, that as the chief use of artificial light is to enable one to see, the ideal photometric test would be to determine at what distance from the source of light one could, for example, look out a train in Bradshaw's Railway Guide, with a reasonable hope of arriving at one's destination. Photomoters based on a principle analogous to this have been several times proposed, and more recently Carter has applied this principle to the Joly Paraffine Block photometer and Prof. Fleming to the Wedge photometer. The arrangement can also be applied with success to the ordinary Trotter form of photometer. (See fig. 4.) The method pursued in this case is to rule on each of the two cards a diagram, usually somewhat similar to a spider's web, and the eye of the observer is placed in such a position that he is readily able to judge whether one of the two patterns is more distinctly visible than the other. As far as the writer is aware, this device has not been very largely used, but it would certainly appear to merit careful consideration, as it forms another possible solution of the colour difficulty, though he must confess that personally he has not been able to obtain anything like such satisfactory results with the "distinctness" photometers, as they are often called, as with the "Flicker."

Street Photometers

The rapid strides made recently in gas lighting, particularly for street illumination, have led to a considerable amount of attention being paid to the question of the distribution of light, and a demand has thus sprung up for a type of photometer which could be used for street work.

The chief points to be aimed at are: (1) Portability; (2) Rapidity of measurement; (3) Ease of [illegible] in a badly-lit position; (4) Accuracy of [illegible] by an untrained observer under adverse conditions.

Before considering the question of how far these requirements are met by modern instruments [illegible]

[illegible] the vexed question of [illegible] illumination measurements [illegible] appear to be largely a [illegible] required. If it be to determine whether a certain street, lit, say, by gas, is as well illuminated as another street lit, perhaps, by arc lamps, then probably an illumination photometer would [illegible] the efficiency of the lamps [illegible] nearly the actual [illegible], preferably at several [illegible]

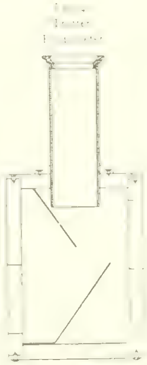


Fig. 4.
Trotter
Photometer

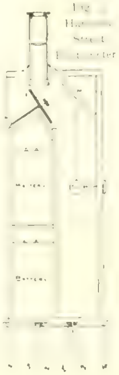
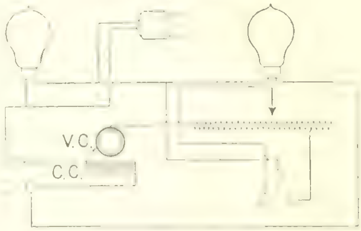


Fig. [illegible]
Harcourt
Street
Photometer

[illegible]



In the case of an illumination photometer, the choice has to be made [illegible] angle for the surface which is to receive the illumination to be measured. Both vertical and horizontal surfaces have their advocates, and both have certain advantages to recommend them. [illegible] a paper read before the Institution of Electrical Engineers at Manchester, [illegible] the adoption of [illegible] the horizontal as a standard position. [illegible] the author rightly so, [illegible] examples are either vertical or horizontal, and that 45° therefore forms a very fair compromise. This angle has, moreover, a number of incidental advantages from the photometric point of view which need not now be entered into, but it may be added that it is extremely easy to calculate from a measurement made on such a surface either the candle-power of the source of light or the illumination on a horizontal or vertical plane as may be required.

Fig. 5 shows diagrammatically the photometer designed by Mr. Hadyn T. Harrison, and so arranged that the illumination measured is that received by a screen at an angle of 45° with the horizontal, this angle being chosen for the reasons already given. An 8-volt glow-lamp forms the standard of light, and the illumination on the rotating screen of the photometer is varied by sliding the lamp backwards and forwards until a balance is obtained. The range of the instrument can be increased to any required extent by employing standard lamps of different candle-power.

The instrument is provided with a carrying handle at the top, and the three supporting legs hinge round so as to be out of the way. Thus it is extremely easy to carry about, and is quite self-contained, the batteries slipping into two compartments in the case.

All things considered, there is no doubt that the best standard is a small 8 or 10-volt glow-lamp worked off a portable accumulator having a capacity of 15 or 20 ampere-hours. It is inadvisable to work at a lower voltage than this owing to the resistance of the lamp circuit then becoming so low that a faulty connection is liable to cause a large variation in the candle-power.

Watt Photometer

What appears to be wanted is an apparatus which can be taken to the consumer's premises on request, and into which a lamp can be placed and its candle-power and current consumption read off with little or no manipulation. In the so-called "Watt photometer" of Messrs. R. P. Wilson and G. M. Hardingham, a very successful attempt has been made to provide such an instrument. It consists of a long box provided with a carrying handle, and which, when hinged back, forms a closed photometer some 4ft. 6in. long, with two adjustable lamp-holders, and a direct-reading candle-power scale. In the centre is a wattmeter, the most novel feature of which is that it is so arranged that the power consumption of the lamp can be read off not only in watts, but also direct in watts per candle-power, on a specially graduated scale. The scheme of connections is shown in Fig. 6, where C C represents the current coil of the wattmeter, and V C the pressure coil. The lamp-holder which carries the lamp under test has fixed to it a sliding contact shown in the illustration as an arrow head, and as the lamp is moved nearer to or further from the photometer, more or less resistance is included in the pressure circuit of the wattmeter. Thus the deflection of the pointer will depend upon the position of the lamp, and this in its turn depends on its candle-power. Hence, after having obtained a photometric balance in the ordinary way, the candle-power is read off the photometer scale, and the watts per candle off one of the wattmeter scales. The two-way key shown on the right of the illustration enables this auxiliary resistance to be thrown out of circuit, and the wattmeter then reads the total watts. The two-way key on the left of the figure enables the current coil of the wattmeter to be cut out of circuit during the photometric test, and thus ensures both lamps receiving the same voltage. The watts per candle scale can, of course, be graduated in any other way, such as in pence per candle-power hour, and so forth.

Recording Instruments.

Whatever may be said of British electrical engineering, there is one direction in which there can be no two opinions as to our pre-eminence, and that is in the design of recording instruments.

The pioneers in recorder design were undoubtedly Messrs. Elliott Bros., and to them belongs the credit of having lifted the recorder out of what might almost be described as the "toy-shop" stage. This was as far back as 1890.

The difficulties to be overcome in the design of an electrical recorder are often under-estimated by engineers.

The chief troubles met with in recorders are inaccuracies in the clocks, spilling or drying up of the ink, and clogging of the pens, as well as the friction and other minor errors. It should be noted that nearly all these difficulties are connected with the inking arrangements, and for that reason it is these which have received the most attention in recent designs.

Frequency Indicators.

Of all electrical quantities, one of the most difficult to measure accurately is the frequency of an alternating current. The earliest attempts were mostly based on the variation in the current passed by a highly-inductive circuit at different frequencies. That such a system must be most unreliable will be at once clear when it is remembered that this current will depend almost as much on wave-form as on frequency. Some makers have endeavoured to get over the difficulty by providing their instruments with a resistance which is variable from the outside of the case, so that after the indicator has been installed the reading can be adjusted to suit the particular wave-form of the generators or

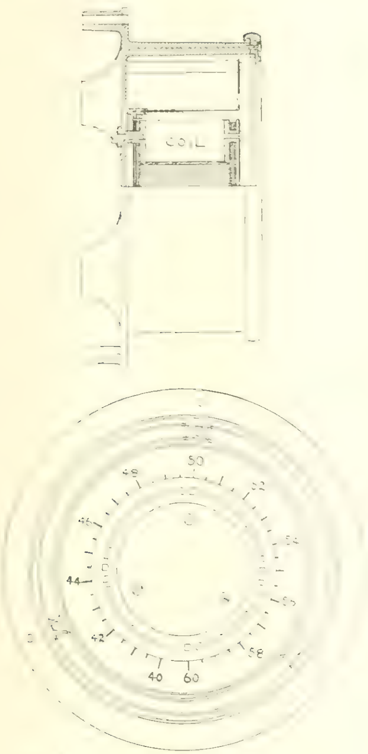
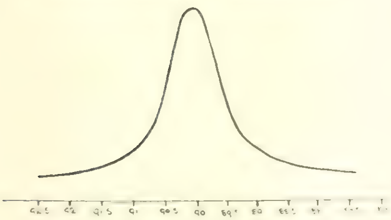


FIG. 8. EVERETT-EDGCUMBE FREQUENCY INDICATOR.

[illegible]



which it is to be used. This solution [illegible] assumes that the wave-form of all the [illegible] station are identical, which assumption is [illegible] hardly ever justifiable.

[illegible] which has been [illegible] meters, and in [illegible] tor is bound to [illegible] rable.

[illegible] the fre- [illegible] as that of the vibra- [illegible] to it, the amplitude of swing will be [illegible] further i [illegible]

[illegible] be at once read off.

[illegible] the previous frequency.

[illegible]

[illegible] Figures.

The Dockyards and the Navy.

Two new docks are projected at Portsmouth, and the building slip lately occupied by the *Dreadnought* is to be extended.

Notice has been issued to the dockyards that, with the object of encouraging talent among the employees, a committee composed of dockyard officers has been appointed by the Admiralty for the purpose of considering original proposals which may be put forward by workmen, and of recommending to the superintendent monetary rewards in those cases where the proposals are considered worthy of adoption or of sufficient merit to receive special recognition.

Among the services for which such awards may be made are suggestions tending to greater economy or increased production, new designs of tools or improvements in existing machines, alterations in methods of manufacture or rearrangement of existing methods of manufacture, saving of waste material, means of utilising cheaper forms of material, and prevention of accidents.

Rear-Admiral Percy Scott has invented a shutter to be attached to the front of search-lights, which will enable the electric beams to flash messages in the Morse code visible for many miles. For teaching purposes he has introduced a model of a ship's barbette built to scale, and freely open to inspection.

At the annual meeting of the Londonderry Chamber of Commerce, Sir John B. Johnston, J.P., president, occupying the chair, it was decided that a deputation from the Chamber should wait on the First Lord of the Admiralty to represent the importance of constituting Lough Foyle as a naval base, and of constructing a Government dockyard, at Londonderry or Lough Swilly.

At the Admiralty, on Thursday, Lord Tweedmouth and Mr. Haldane received a deputation from the Parliamentary Committee of the Trades Union Congress in reference to a variety of questions, including apprenticeship and dockyard wages. The deputation complained that nothing had been done since last year, when a distinct pledge was given by a previous First Lord that the matter should be fully considered.

A speaker from Barry said it frequently happened that skilled mechanics in Government yards received 21s. a week, which could increase to a maximum of 27s. for fitters, riveters, and caulkers, the maximum for holders-up being 24s. That was considerably lower than what was paid in private yards. In some cases the difference was as much as 12s. a week.

Lord Tweedmouth, in the course of his reply, assured the deputation that he was prepared to inquire into the subject very fully. At the same time, he would remind them that there was another side of the question, and he did not know whether, if the proposals of the deputation were adopted, the Admiralty would not find themselves obliged much more frequently to discharge the men from the dockyards than they did at present.

The construction work was limited in amount. The practice had been to employ skilled labour from time to time on work which outside was done by separate trades. By that means they had been enabled to keep a much larger number of men employed in the docks. There was the instance of the *Dreadnought*. An enormous number of riveters had been employed in a comparatively short time. That work was over, and if other work could not be found for the men they would have to be discharged.

He ought also to remind them that the Admiralty were not careless of the interests of their employees—that they endeavoured to inquire fully into all complaints, and that they did endeavour strictly to conform to the rule that the Admiralty, as a Government department, should be as good an employer as anyone outside. That was their desire.

He sometimes thought, however, that a mistake was made by comparing the weekly wage of the outside employer with the weekly wage paid by the Government. The average time for work in Government dockyards was 48 hours a week, but he was informed that the hours worked outside were 54. Consequently it was not fair to compare the wages paid by both those bodies.

It was the desire of the Admiralty to establish an even 48-hour week throughout the year, not to vary from season to season, and he was extremely anxious, as far as he possibly could, to reduce overtime. Since he had been at the Admiralty it had struck him that overtime was too much resorted to in the dockyards. He must not be understood to hold out any hope of overtime being entirely done away with.

As to the suggested conference, he would not give a final answer then. He thought some such plan might with advantage be adopted, but he proposed in the meantime, after carefully examining the petitions, that some of the officials of the Admiralty should specially visit the dockyards in order to have interviews with the men, and get into touch with them. He hoped that would be proof of his desire that the whole thing should be looked into. When he had received the reports he would be ready to consider the question of a conference between the representatives of the men and representatives of the Admiralty.

Mr. Haldane, in reply to some further questions, said that as regarded sweating under Government contracts, he need hardly say that it was their desire that, just as the Government wished to be a model employer, it ought to deal only with model employees. The War Office had abolished the system of fellowship piecework. As regards the manufacture of lyddite shells, they were also looking into the question to see how far it would be to the advantage of the men and consistent with general interest to substitute the ordinary system for fellowship piecework in the manufacture of ammunition generally, but he would defer any definite opinion on this matter until he had further inquired into it.

Our Weekly Biography.

Standen Leonard Pearce, A.M.Inst.C.E., M.I.E.E., M.I.Mech.E., Chief Electrical Engineer to the Corporation of Manchester.

ALTHOUGH comparatively a young man, Mr. S. L. Pearce has already gained a varied and extensive experience in the electrical world, and, at the age of thirty-three, he found himself at the head of the electricity department in the City of Manchester. Born in 1872, he pursued his primary education at Bishop's Stortford College for seven years, and subsequently, under the direction of Dr. Silvanus P. Thompson, he underwent a two years' course in electrical engineering at the Finsbury Technical College.

Upon the completion of his college training he was apprenticed for four years to Messrs. J. G. Statter and Co., of West Drayton. At the end of the second year the firm dissolved partnership, and Mr. Pearce continued his apprenticeship with Messrs. Thomas Richardson and Sons, marine and electrical engineers, Hartlepool. He spent about three-and-a-half years gaining practical knowledge in the various workshops of this company, and then entered the drawing office, remaining in this department for a further two years. In order to gain a wider experience he joined the British India Steam Navigation Company, Ltd., and for two years acted as engineer-in-charge of a watch, and was responsible for the control of the electrical and hydraulic machinery utilised on their ships, as well as the main machinery.

STANDEN LEONARD PEARCE, A.M.INST.C.E., ETC.

In [illegible] Mr. Pearce was appointed an assistant engineer to the Metropolitan Electric Supply Company Ltd., commencing at their Rathbone Place generating station. He was subsequently transferred to the Manchester Square station, and later on to the Sardinia Street station. During his period of office here—one of the pioneer electrical supply undertakings in the metropolis—Mr. Pearce gained valuable experience in several directions, and notably when the supply from this station was largely changed over from alternating current to direct current. Three years later he was offered a post on the staff of the British Thomson-Houston Company, who then had the contract for the electrical equipment of the Central London Railway. As our readers will no doubt remember, this was the first railway in England to be equipped on the composite system, viz., employing high-tension three-phase currents for generation and distribution, and low pressure direct-current for the train motors. The Tube having been completed, Mr. Pearce was requested to transfer his services to the Central London Railway Company, and he became their superintendent engineer at the Shepherd's Bush generating station.

In 1901 he went northwards, having applied for and secured the position of deputy chief electrical engineer to the Corporation of Manchester. At the time Mr. Pearce came to Manchester a very large amount of constructive work had to be undertaken by the department, in view of the taking over by the Corporation of the existing tramway undertaking, and its consequent electrical equipment. This meant the erection of two additional generating stations, together with some twenty sub-stations, and a very considerable amount of main laying. In [illegible], on the retirement of the then chief engineer, he was elected to that office, which position he continues to hold.

Mr. S. L. Pearce is an Associate Member of the Institution of Civil Engineers, having passed the examination prescribed by the Council of that Institution in [illegible], a Member of the Institution of Electrical Engineers, a Member of the Institution of Mechanical Engineers, and also a Member of the Municipal Association of Engineers, having a seat on the Council of the latter body. He is also president for the current year of the Manchester local section of the Institution of Electrical Engineers.

Of the few contributions made by Mr. Pearce to the electrical literature of the day, perhaps the best known are the paper on "Polyphase Sub-stations, their Equipment and Management," read before the Municipal Electrical Association in [illegible], and a report on "Street Lighting in Manchester," published the same year.

Institution of Electrical Engineers.

Invitation to Kindred Institutions.

The Council of the Institution of Electrical Engineers consider it desirable that the Institution should endeavour in 1906 to return in some measure the courtesies received in past years from kindred electrical institutions in Europe and America, and, with this object, invitations have been issued to various associations abroad. Cordial acceptances have been received from the following: The Canadian Electrical Association; The Société Internationale des Electriciens: The Elektrotechnischer Verein; The Verband Deutscher Elektrotechniker; The Associazione Elettrotecnica Italiana; The Schweizerischer Elektrotechnischer Verein; The American Institute of Electrical Engineers. Some of the leading Continental electrical engineering firms will also be represented.

An outline of the programme in London and of the itinerary through the local centres is appended:—

June 23rd and 24th.—Central Committee Rooms at the Hotel Cecil will be open for registration of visitors and members.

June 25th.—Afternoon. A visit to the National Physical Laboratory may be arranged, to attend the ceremony of opening the new electro-technical laboratory.

In the evening, reception and banquet at the Hotel Cecil.

June 26th.—Visits to the General Post Office; power and electric lighting stations, railway and tramway power stations, engineering works, telephone exchanges, and other undertakings and places of interest.

In the evening, conversazione at the Natural History Museum.

June 27th.—Excursion up the Thames and visit to Windsor.

June 28th.—Leave London for Birmingham district. The programme will include visits to works in and near Birmingham, including Rugby and Stafford.

Arrive Manchester in the evening.

June 29th.—Manchester district: Visits to electricity stations and works in Manchester, Salford and the neighbourhood. Conversazione at the Town Hall in the evening.

June 30th.—Proceed to Liverpool. Visits to electricity stations, works, and railways. Leave in the afternoon for the Lake District (Windermere).

July 1st.—Excursions in the Lake District. Proceed to Glasgow in the evening.

July 2nd.—Glasgow district: Visits to works, and reception by Lord Kelvin.

July 3rd.—Visits and excursions in the neighbourhood of Glasgow.

July 4th.—Leave Glasgow for Edinburgh. In the afternoon leave Edinburgh for Newcastle.

July 5th.—Newcastle district. Visit to works and power station.

July 6th.—Leave Newcastle for Leeds. Visit to works, and excursions in the neighbourhood of Leeds.

July 7th (Saturday).—Leave Leeds for London.

Entertainment will be provided in London and local centres for the ladies of the party and those of their friends who desire to accompany them.

Wages in the Engineering and Shipbuilding Trades.

A paper on "Wages in the Engineering and Shipbuilding Industries since 1790," by A. L. Bowley and G. H. Wood, was read last week at the meeting of the Royal Statistical Society. The influence on wages of the varying importance of districts, the transference of labour from one occupation to another, the change from wooden to iron and to steel ships, were discussed and analysed in detail. It was found that, on the whole, there had been no degradation of employment, as is sometimes supposed to have been the result of increasing machinery, but that the various grades of labour have, in spite of the many changes, continued to bear nearly the same proportion to each other; what alteration there is arises from the growth in numbers of machinists, which represents as much a step up for labourers as a step down for artisans.

The main body of statistics relates to the period 1850 to 1905. Wages of shipbuilders have fluctuated more violently, but on the whole risen more than wages of engineers. The rises of the two combined have been in 1850–54, 10 per cent.; 1860–66, 9 per cent.; 1869 to 1874, 15 per cent.; 1879 to 1883, 7 per cent.; 1887 to 1890, 12 per cent.; and 1895 to 1898, 10 per cent. The falls have been, 1856–59, 3 per cent.; 1866–68, 3 per cent.; 1877–79, 5 per cent.; 1883–86, 8 per cent.; 1891–94, 4 per cent.; and 2 per cent. since 1900. Each percentage is reckoned on the average at the beginning of the period covered. Average wages in 1905, allowing for all known corrections, were 46 per cent. higher than in 1850, 37 per cent. than in 1860, 27 per cent. than in 1870, 18 per cent. than in 1880, and 6 per cent. than in 1890.

The changes have varied a good deal from district to district, and from occupation to occupation. London, where wages reached a high level at an early date, has made slow progress, while wages at Belfast and the Clyde have increased 50 per cent. or 60 per cent. since 1860. Platers, riveters, and shipwrights have enjoyed a specially rapid increase. The bulk of the members of the Amalgamated Society of Engineers have made steady, but not sensational, progress, and labourers have improved their wages at very nearly the same rate as engineers. The evidence for the period 1790 to 1850 is less certain. A great rise, perhaps 50 per cent., took place soon after 1793. From 1801 to 1850 wages were all but stationary.

Correspondence.

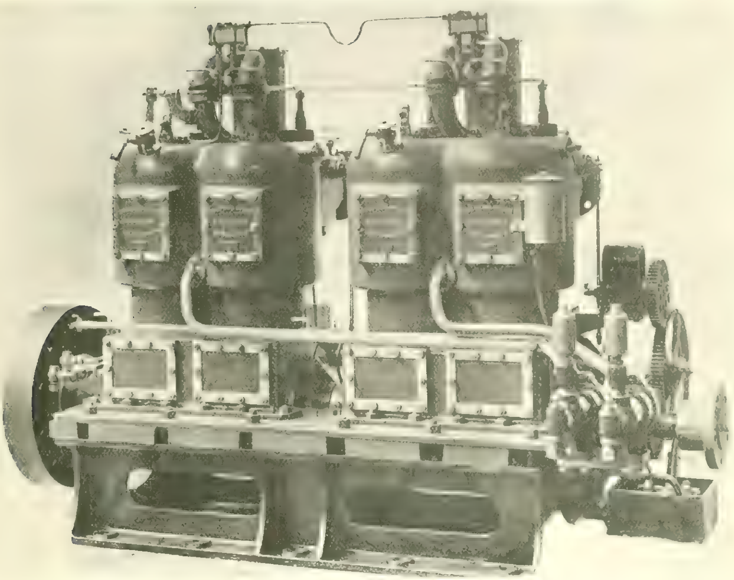
Buckhurst Hill,
Essex.

To the Editor of PAGE'S WEEKLY.

DEAR SIR,—In your obituary notice of my friend, the late Mr. Oswald Brown, you state that he was, at 31, the youngest full member received into the Institution of Civil Engineers.

The present chief engineer to the Metropolitan Water Board was full member at the age of 30, the year before Mr. Brown was admitted.

Yours truly,
WILLIAM B. BRYAN.



FOUR-CYLINDER VOSPER ENGINE FOR THE ADMIRALTY.

80 b.h.p. Motor.

In the above illustration is shown the latest "Vosper" paraffin motor. It is of the four-cylinder type, and has been built by Messrs. Vosper and Co., Ltd., for the Admiralty. The motor, which is to be fitted into a 46 ft. pinnace, gives out 80 b.h.p. An auxiliary motor of the single-cylinder type is provided for working an air compressor, which discharges into an air reservoir used for starting the larger motor. The lubrication is on the "forced" principle, worked by a pump driven from cam shaft. This cam shaft also works the magneto and sparking plugs for electric ignition. The cylinders are of cast iron, water-cooled, and connecting rods, crank shaft, levers, rods, etc., of forged mild steel. The exhaust is also water-cooled. We understand that a repeat order has been received from the Admiralty for a similar 80 b.h.p. motor complete, with a 40 ft. admiral's barge for service at Devonport. Among other work the firm have at present in hand a 28 ft. launch with a four-cylinder 25 b.h.p. motor for the Argentine Government.

Coremaking Practice.

On Saturday last, at a meeting in connection with the Staffordshire Iron and Steel Institute Association held at the Institute, Dudley, under the presidency of Mr. Walter Jones, a paper was read by Mr. Robert Buchanan, on "Principles and Practice of Coremaking." Mr. Buchanan said the part of the mould or core which comes in direct contact with the molten metal was invariably formed from a mixture of which silica or sand formed the greater part. The only exception was when iron moulds, either as a whole or in part, were used to form "chill" castings, namely, those having a hardened surface, due to the quick cooling of the iron run into the chill mould. Silica, or sand, was infusible at the highest temperature obtainable in ordinary workshop practice. Hence its use in foundries as the material used for direct contact with metal. Silica by itself, however, wanted one quality which must be present before moulds or cores could be made. That quality was cohesion or "bond," and was usually absent when the sand was pure silica, as in the case of "silver" sand.

Large Locomotive Boilers.

By G. J. Churchward, Chief Mechanical Engineer, Great Western Railway.

Continued from page 427.

I OUGHT to note the gradual extension of the practice of making the top of the fire-box and casing flat instead of round. On the Great Western Railway less trouble has been experienced with the flat top fire-box than with the round top, although no sling-stays of any kind are used. The flat top has the important advantage of increasing the area of the water line at the hottest part of the boiler, and so materially contributes to the reduction of foaming. This, combined with the coned connection to the barrel, has enabled the dome, always a source of weakness, to be entirely dispensed with and drier steam obtained. The author some years ago made an experiment to settle this much-disputed point. Two identical engines and boilers were taken—one boiler having a dome in the usual position on the barrel, the other having no dome, the steam being taken by a pipe from the top of the flat fire-box casing. The engine without the dome proved to be decidedly freer from priming than the other. The liberal dimension of 2 ft. between the top of the fire-box and the inside of the casing no doubt contributed to this satisfactory result. The coned barrel connection, in addition to providing a greater area of water-line, also gives a larger steam capacity, and, by the larger diameter being arranged to coincide with the line of the fire-box tube plate, much more water-space at the sides of the tubes is possible. On consideration of the great intensity of temperature at the fire-box plate as compared with that at the smoke-box plate, the advantage of the arrangement is obvious.

Fire-box Stays.

There is really little to be said as to fire-box stays. The stay question is in very much the same position in which it has always been. For the present high-pressures copper is still

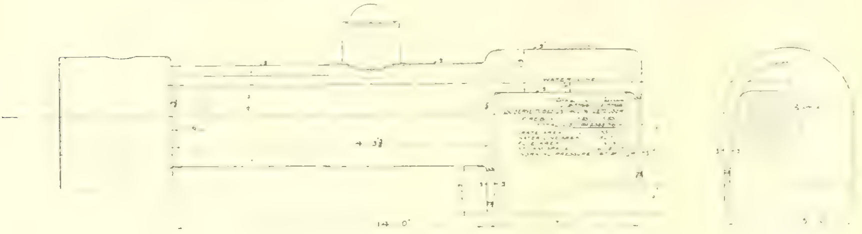


FIG. 11. No. 30 GREAT WESTERN.

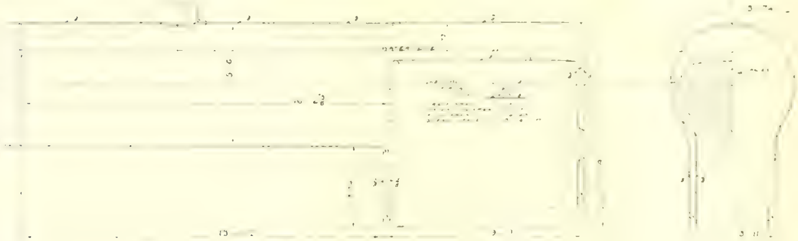


FIG. 12. NORTH EASTERN.

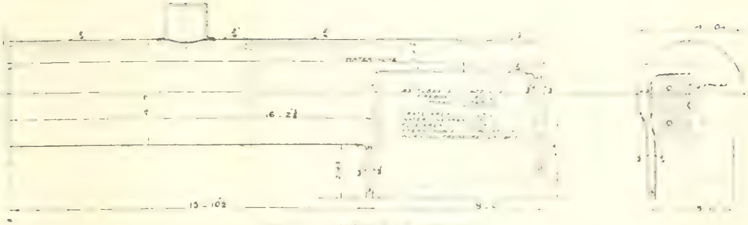


FIG. 13. NORTH EASTERN.

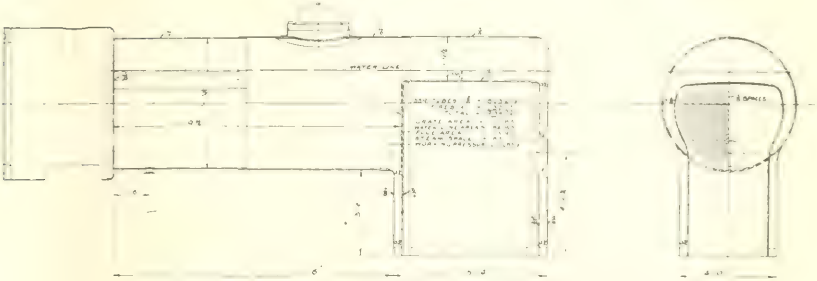


FIG. 25. "CAWDOR."—GREAT WESTERN.

FIG. 15. NEW [illegible] COMPOUND, [illegible]

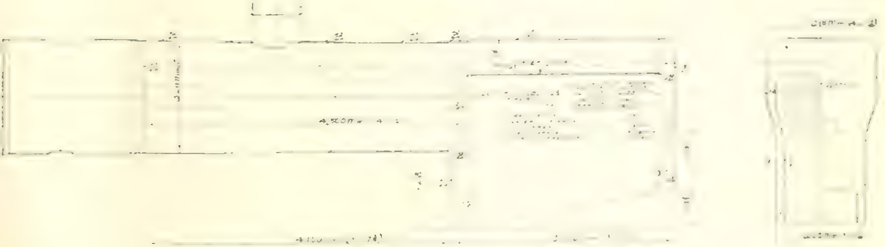


FIG. 16. "[illegible]" [illegible]

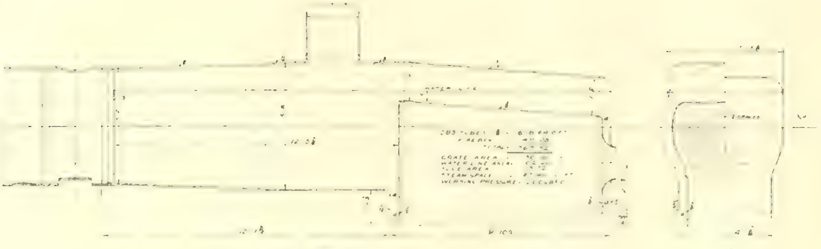


FIG. 17. CHICAGO, BURLINGTON AND QUINCY.

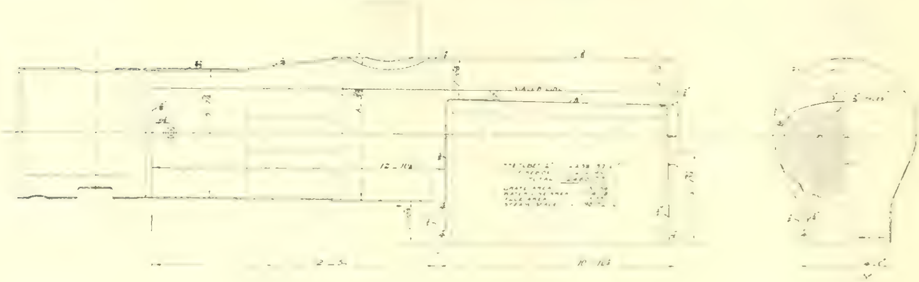


FIG. 18. ILLINOIS CENTRAL.

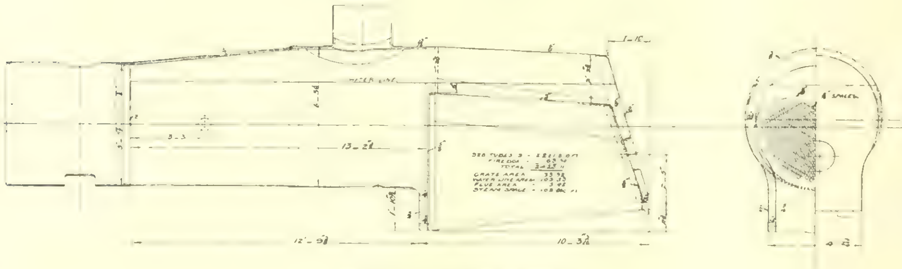


FIG. 19. CANADIAN PACIFIC.

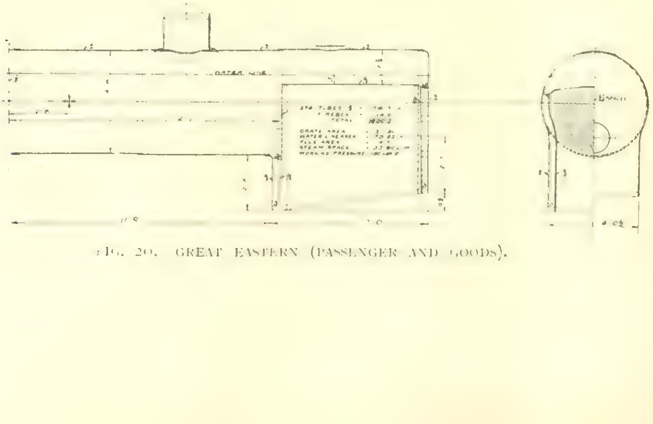


FIG. 20. GREAT EASTERN (PASSENGER AND GOODS).

being used below the fire-line with closer spacing down to 3¼ in. pitch. Bronze is often used above the fire, and the boilers of the De Glehn compounds are so fitted. In America Yorkshire iron is still used, and recently Professor Hibbard experimenting there on some iron stays, arrived at the astonishing fact that the ductility of iron stays increased instead of diminished with the higher pressures now common. The author is using a few Taylor-iron stays experimentally with a view of ascertaining whether this material is more durable than copper, under the conditions brought about by the increased temperatures in modern boilers. Experiments are being made by many engineers with water-tubes in fire-boxes—notably by Mr. Drummond, of the London and South Western Railway, who is so satisfied with the results that he is building this type entirely. Unfortunately it is a necessity to have a deep fire-box in order to employ water-tubes effectively, or it is probable that many engineers would be following Mr. Drummond's example.

The Employment of Superheaters.

The employment of a superheater is having an extended trial in Germany, and also in Canada. This affords the prospect of obtaining the same steam efficiency by the use of, say, 175 lb. pressure, as by employing the pressures of, say, 200 lb. to 225 lb. This, no doubt offers some prospect of success, and is attractive from the fact that the alternative of compounding necessitates the use of the higher pressures and consequently presents no hope of relief from boiler troubles.

The Great Western Railway are fitting one of their Standard No. 1 boilers with the Schmidt arrangement, with a view to see what advantage can be gained with the simple engine. Formerly the power of a locomotive was estimated largely from the capacity of its cylinders, and this led occasionally to the use of cylinders of such dimensions that the boilers provided were not capable of generating sufficient steam to enable them to be worked at their maximum economical power for any length of run. To-day

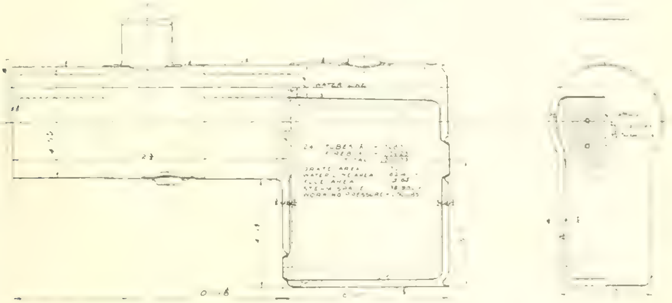


FIG. 21. LONDON AND NORTH WESTERN.

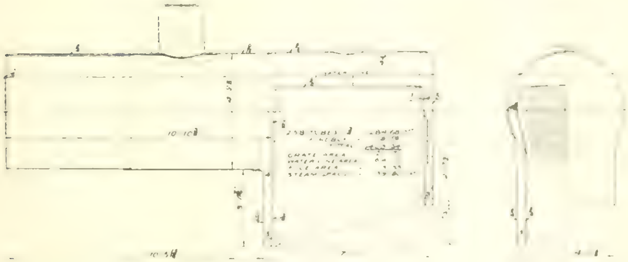


FIG. 22. MIDLAND.

Fig	Engine	Type	Cylinders.	Fig.	Coupled Wheels.	Weight.		Total Heating Surface.
						On Coupled Wheels.	Total of Engine.	
					Diameter. ft. ins.	Tons. Cwts.	Tons. Cwts.	Square feet.
1	Mallet Compound—Baltimore and Ohio	0-12-0 Articulated	20 32 ×32	1	4 8	144 5	144 5	5,600
2	Lake Shore and Michigan Southern	2-6-2	20½ ×28	2	6 8	58 0	77 18	3,343
3	Great Eastern	0-10-0 T	18½ ×24	3	4 6	80 0	80 0	3,010
4	Baldwin Compound—Atchison-Topeka and Santa Fe	2-10-2	19 32 ×32	4	4 9	104 15	128 0	4,796
5	Cole 4 Cyl Compound—New York Central and Hudson River	4-4-2	15½ 26 ×26	5	6 7	49 0	89 0	3,446
6	Compound—Colorado and Southern	2-8-0	16 28 ×32	6	4 9	79 8	90 8	2,966
7	Chicago and Alton	4-6-2	22 ×28	7	6 5	60 6	99 0	3,053
8	Great Northern	4-4-2	19 ×24	8	6 7½	36 0	65 10	2,500
9	Baldwin 4 Cylinder Compound—Chicago, Burlington and Quincy	4-4-2	15 25 ×26	9	6 6	41 8	87 14	3,217
10	Great Western	2-6-0	19 ×28	10	4 7½	51 16	60 8	1,933
11	Do. Do	4-6-0	20 ×24	11	4 7½	47 4	59 10	1,518 Distributing 2,388 Absorbing (Serve Tubes)
12	North Eastern	4-4-2	20 ×28	12	6 10	39 0	72 0	2,456
13	Do. Do	4-6-0	20 ×26	13	6 8¼	34 17	67 2	1,769
14	Great Western	4-4-2 4-6-0 2-8-0	18 ×30 18 ×30 18 ×30	14	6 8½ 6 8½ 6 8½	39 0 54 4 61 18	70 10 70 4 68 6	— 2,143 —
15	New De Glehn Compound—Great Western	4-4-2	$14\frac{3}{16}$ $23\frac{3}{8}$ $\times 25\frac{3}{16}$	15	6 8½	39 0	73 6	1,617 Distributing 2,756 Absorbing (Serve Tubes)
16	"La France," Great Western	4-4-2	$13\frac{3}{8}$ $22\frac{1}{16}$ $\times 25\frac{3}{16}$	16	6 8½	33 7	64 13	1,446 Distributing 2,456 Absorbing (Serve Tubes)
17	Chicago, Burlington and Quincy	—	—	17	—	—	—	1,768
18	Illinois Central	—	—	18	—	—	—	2,461
19	Canadian Pacific	2-6-2	20 ×26	19	5 9	56 12	73 8	2,425
20	Great Eastern	4-4-0 0-6-0	19 ×26 19 ×26	20	7 0 4 11	33 19 43 14	51 13½ 43 14	1,630
21	London and North Western	4-4-0	15 20½ ×24	21	7 0	37 0	57 12	1,508
22	Midland	0-6-0	18 ×26	22	5 3	43 16	43 16	1,403
23	Compound—Midland	4-4-0	19 21 ×26	23	7 0	38 3	58 9	1,598 outside plain tubes
24	North Eastern	4-4-0	19 ×26	24	6 10	35 5	51 14	1,413
25	Great Western	4-4-0	18 ×26	25	6 8½	35 10	56 14	1,934
26	Do. Do	4-4-0 4-4-0	18 ×30 18 ×26	26	6 8½ 6 8½	34 6 36 2	55 6 55 6	1,818
27	Water tube—London and South Western	4-4-0	19 ×26	27	6 7	37 2	53 19	1,550
—	Do. Do.	4-6-0	4 (16×24)	—	6 0	51 10	73 0	2,727

TABLE GIVING PARTICULARS OF CYLINDERS AND DIAMETERS OF DRIVING WHEELS USED IN CONNECTION WITH THE DIFFERENT TYPES OF BOILERS DISCUSSED IN MR. CHURCHWARD'S PAPER.

Fitted with [illegible] Boiler Tubes (Serve Tubes not as at present).

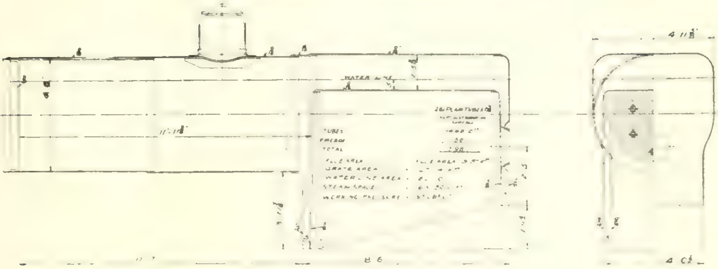


FIG. 23. COMPOUND, MIDLAND.

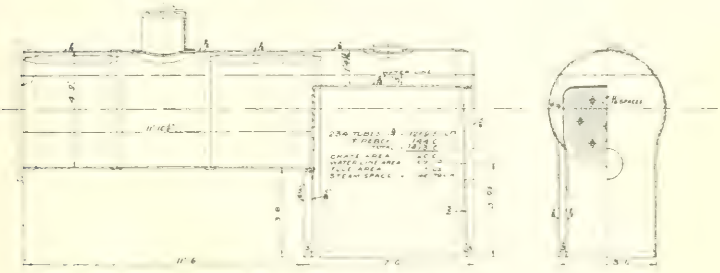


FIG. 24. NORTH EASTERN.

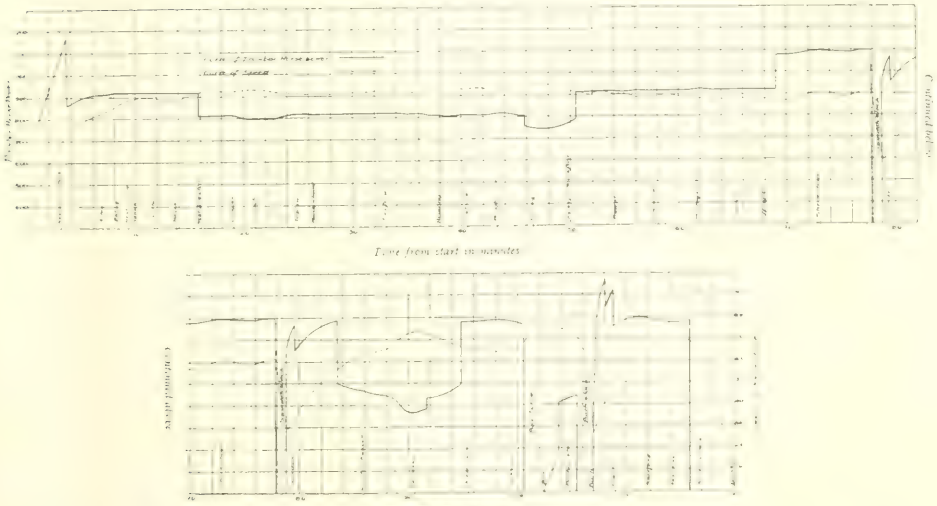
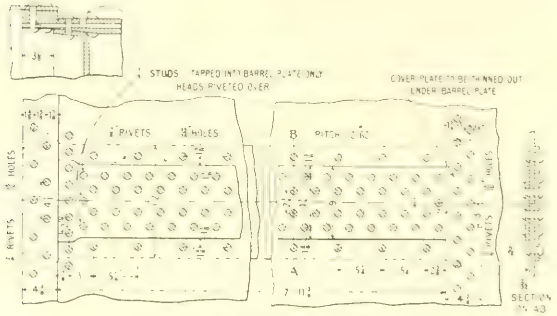


FIG. 30. POWER AND SPEED, PLOTTED ON A TIME BASE, FOR A TRAIN FROM PADDINGTON TO BRISTOL.

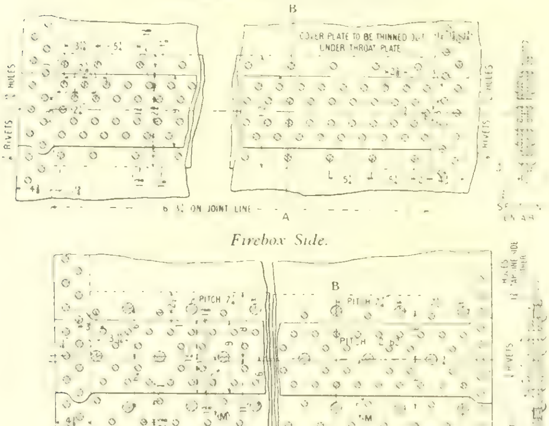
this is changed, and the first consideration is the capacity of the boiler.

High Pressures and Efficiency.

A table (p. 482) is presented showing the dimensions of cylinders and diameter of driving wheels used in connection with the various boilers illustrated, and an examination of the ratios will show how much more heating surface is now provided for a given area of cylinder than used to be considered necessary. The higher pressures now common have undoubtedly produced much more efficient locomotives, both in respect of hauling power and coal consumption. This improvement has been very marked with every increment of pressure, right up to 227 lb., carried by the De Glehn compounds. These have been most successful compounds, and the high pressure carried is no doubt an important factor. By employing 225 lb. per square inch in the simple engine, and making the necessary improvements in the steam distribution, enabling higher cut-offs to be used, corresponding improvements in efficiency and economy of fuel have been obtained. Great increase in the draw-bar pulls at high speed has also resulted. Of course, the price for these improvements has to be paid in the matter of fire-box repairs and renewals, but it is probably better to submit to this expense than to employ the very much heavier and more costly machines which would be necessary to give the same hauling power at speed. Fig. 29 shows full particulars of the riveting on barrel and fire-box butt-joints of the Standard No. 1 boiler on the Great Western Railway.


STUDS TAPPED INTO BARREL PLATE ONLY HEADS RIVETED OVER
COVER PLATE TO BE THINNED OUT UNDER BARREL PLATE
RIVETS
HOLES
B
PITCH
A
SECTION ON AB

Longitudinal Butt Joints.—Barrel



Firebox Side.

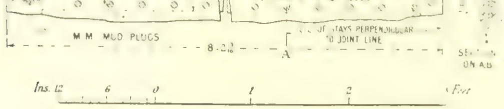


FIG. 29. BOILER DETAILS.—GREAT WESTERN. STANDARD BOILER NO. 1. JUNE, 1902.

Fig. 30 shows the curves of draw-bar h.p. and speed plotted on a time base for an engine of the 4-6-0 type on a run from Paddington to Bristol. This engine carries the boiler shown on fig. 14, the pressure being 225 lb. per square inch.

The author has to express his cordial thanks to the many engineers who have so kindly furnished him with the drawings of boilers, from which the diagrams accompanying this paper are produced.

Paper read before the Institution of Mechanical Engineers.

Our Review of the Week.

From Our Own Correspondents.

Scotland.

GLASGOW.

A Revival in Sight.

In Scotland as elsewhere makers have declined to follow the fall in [illegible] to anything like the full extent, as they were so well sold that they could afford to ignore what they believe to be a temporary depression in the speculative market. They are already, indeed, looking for a considerable improvement, and the slight recovery which has already taken place is only in accordance with expectation. In the steel trade makers have many orders on hand, and one hears of good inquiries from the far East, as well as from Canada. The revival in shipbuilding has already been noted, and some excellent orders have been booked by local yards, including a big contract from the Thames Conservancy. The malleable iron trade is rather quiet, but steels remain steady.

Machine Tool Trade.

There is an excellent inquiry for high-speed tools and the tendency to prefer British to American tools in this respect is quite noteworthy. It appears to be perfectly well recognised that the American tool lacks the rigidity in gearing and feed of the home-made article. Messrs. J. Lang and Sons, Ltd., of Johnstone, who are extending their works, are sending out new designs of hollow-spindle, capstan lathes, and the variable speed-gear of this firm is also being inquired for. Messrs. Shanks and Co., who are well-known in connection with heavy types of tools, have given up the treble headstocks, and are confining themselves to double and quadruple gear. Those who have seen recent makes of their lathes, will have noticed improvements which ought to give the machine a longer life. In their latest type of lathe, the first drive, which may be through a motor or broad cone pulley, is direct on to the face plate. The surfacing motions are independent of the sliding motions and [illegible] feed, and can be made to do duplex taper work by the combination of two feeds. A novelty in the machine tool branch is the new line of high-speed radial drilling machines, being brought out by Dron and Lawson, Ltd., Glasgow. It is claimed that these machines will take in any drill that twist drill makers can produce. This firm have also just designed a new tube-cutting machine, driven by an electric motor, of which further particulars will be available in the near future. Other novelties include a new winding machine by D. J. Macdonald, Dundee. The machine is provided with a band of stamped sheet metal or steel, which can be removed and replaced with a fresh one when it becomes grooved by the thread.

Labour Crisis in Shipbuilding.

The trade unions concerned in the shipbuilding industry of the Clyde have been engaged during the past week balloting the members of their local branches for or against a strike. The question at issue is the old one of pay-days. Hitherto the system which has existed for years is to pay wages fortnightly at the shipyards and engine shops. The trade unions have demanded the institution of a weekly pay system, the same as in the North of England. Several conferences on the subject have been held between representatives of the Clyde Shipbuilders' Association and the Scottish section of the Federation of Engineering Employers. At a final conference towards the end of last year intimation was made to the men that, after careful consideration, and weighing all the [illegible], the two associations of employers had decided that they could not make the change demanded. The result of the ballots taken by the trade societies on the question were to be reported on the [illegible] inst. with the secretaries of the Federation of Shipbuilding and Engineering Trade Unions, and the General Federation of Trade Unions. In these federations are included the Amalgamated Society of Engineers, the Society of Boilermakers and Iron and Steel Shipbuilders, the United Machine Workers, the Associated Shipwrights, the Associated Blacksmiths, the Society of Smiths and Strikers, the Associated Ironmoulders, [illegible] Cutters, and the various other unions of men engaged in the shipbuilding and engineering industries. The two federations of employers, it is stated, regard a strike as less disastrous than giving way to a demand.

Development of Ship Designs.

At the sixteenth annual meeting of the British Corporation for the Survey and Registry of Shipping, held last week in the head office in Glasgow, Mr. Fred. J. Stephen, in submitting his report of the work of the technical committee, said that in the beginning of the year an exhaustive revision of the rules and tables of scantlings was made, bringing them up to date [illegible], important modifications and improvements being introduced. For instance, the steel testing requirements had been brought into line with the findings of the British Standards Committee, on which the Corporation was represented, and in whose work it had taken a keen interest. The tendency of design in ship construction, as shown by the plans considered by the committee, was very marked, toward a reduction in [illegible] and the obtaining of greater [illegible] construction, out of the [illegible] realised by the [illegible] [illegible] and those with unobstructed holds was still growing. Perhaps the most interesting developments in this line were those represented by the Harroway "cantilever frame" and the Doxford "beamless and stanchionless turret," to both of which designs the technical committee had given very careful consideration.

Clyde Builders and Motor Launches.

Clyde firms have let an order for two 45 ft. patrol motor launches go past them. The Egyptian Government wished these launches for service on the [illegible] Canal, and they commissioned Mr. A. M. Gordon, naval architect, Glasgow, to place the orders for them. Mr. Gordon issued specifications to all the likely builders, but among the dozen firms who tendered not one was Scottish. Several of those who replied stated that they had had the conditions of tender under consideration, but felt that it would be difficult to obtain the high speed desired, and also fulfil all the other conditions. A [illegible] firm, therefore, got the contract.

Refuse Destructor at Clydebank.

A start has now been made by Messrs. Heenan and Froude, Birmingham, with the erection of the refuse destructor at Whitecrook, Clydebank, for the Town Council of that burgh. The Council decided [illegible] months ago on the back-feed system of the firm above named, who have also just been given the contract for the clinker crushing machinery and the mortar mill, which completes the scheme. The total cost of the destructor will come to nearly [illegible].

Shipbuilding Orders.

Messrs. Maclay and M'Intyre, Glasgow, have, it is stated, just contracted for two high-class cargo steamers, each of about 7,000 tons carrying capacity. One is to be built by Messrs. D. and W. Henderson and Co., Ltd., Meadowside, and the other by Messrs. A. Stephen and Sons, Ltd., Linthouse. Messrs. William Sloan and Co., Glasgow, have placed with the Ailsa Shipbuilding Company, Ltd., Troon, an order for a screw steamer of about 1,200 tons gross. The vessel, which will have engines by Messrs. Dunsmuir and Jackson, Govan, has been designed by Mr. A. M. Gordon, of Glasgow.

Engineers' Garden City.

About fifty acres of ground on the Dumbuck Estate, in the neighbourhood of Dumbarton, has been acquired by Kosmoids, Ltd., for the purpose of founding a garden city. Already large workshops are being built, and an electric power-station, a Mond gas generating plant, and an isolated shed for chemical experiments have been erected. Between 5,000 and 6,000 hands will be employed.

North-East Coast.

NEWCASTLE-ON-TYNE.

The Trade Outlook

The continued unsatisfactory position of the warrant market is reflected in the condition of the local iron trade, and so long as iron goes into store at the rate it has recently, it would be futile to look for any marked improvement in business. Those in a position to know are emphatic that too much pig-iron is being made in this district. The less satisfactory American reports have also had a tendency to depress the market here, for they minimise the chances of American consumers taking Cleveland pig-iron. The likelihood of a good American demand springing up for ordinary Cleveland iron was the reason for much of the speculation that has been going on for the last eighteen months. All qualities of Cleveland pig-iron have been reduced, No. 1 being down to 50s., No. [illegible], No. 4 foundry to 48s., No. 4 [illegible], and mottled and white to 47s. 3d. [illegible] qualities are nevertheless scarce, but [illegible] plentiful enough, seeing that there are [illegible] tons of it in Connal's alone. The hematite iron business has become rather quieter, [illegible] somewhat weaker, partly owing to the [illegible] competition of the West Coast firms, who have reduced their quotations. The demand for manufactured iron and steel has slackened, [illegible] not affect the producers, who have plenty of orders to render them independent for some time to come, and they will not reduce their quotations, as a reference to the list of prices current will show.

Cleveland Iron.

The price of Cleveland iron fell steadily during February, although the shipments from the Tees were heavy in comparison with those usual at this time of the year. The current value is, however still above what it was twelve months ago, though the stocks in the warrant stores have increased considerably. It will be interesting to watch whether the fuller shipments usual with the spring will stop that increase; for, with a stock of nearly 700,000 tons, any prolonged increase would be detrimental to the prospects of the trade.

Cleveland and Hematite Prices Compared.

The recent fall in the price of Cleveland pig-iron, with the slighter fall in the price of hematite, has increased the difference in price between the two—a difference that is more than usual. A year ago, that difference was rather less than is customary—it was only about [illegible]; now it is much above the usual margin—it is not far from 15s. It is quite probable that this is in part due to the relative growth of the demand for the two kinds of pig iron, but it is aided by the increase of the stocks of Cleveland iron in the last ten or twelve months especially. The fall in the price of Cleveland iron may tempt more buyers, and it may in time have the result of checking the extent of the production of Cleveland pig, for it is concurrent with some increase in the cost of production, though not as yet to any very great extent. The demand for hematite is still full, and seems likely at the present time to continue so.

Chair of Naval Architecture at Sunderland.

The Sunderland Education Committee have decided to found a chair of naval architecture in connection with their Technical College, and have asked the shipbuilding and other firms of the Wear district to co-operate with them.

Locomotive Contracts at Darlington.

Messrs. Robert Stephenson and Co., Ltd., have received important contracts for the delivery of six powerful, six-wheeled, coupled bogie passenger express locomotives for the Oudh and Rohilkhund State Railway of India, and also for six "Consolidation" type locomotives for the Leopoldina Railway. The locomotives for the Oudh and Rohilkhund Railway will have cylinders 19 in. by [illegible] in. stroke; coupled wheels [illegible] ft. [illegible] in. in diameter, and bogie wheels 3 ft. 7 in. in diameter. The boiler will have a working-pressure of 180 lbs. per square inch, and will have its centre line "pitched" 8 ft. 9¾ in. above rail level. The total heating service will amount to 1,652 square feet, and the grate area will be 29·5 square feet. Exclusive of tender, the engine will weigh 61·875 tons, whilst the tender, carried upon six 3 ft. 7 in. wheels, will weigh an additional [illegible] tons, and have a water capacity of 3,000 gallons, and space for [illegible] tons of coal and [illegible]. The "Consolidation" locomotives for the Leopoldina Railway will be built for the Metre gauge, and fitted with cylinders [illegible] in. diameter by [illegible] in. piston stroke. The coupled wheels will be [illegible] ft. [illegible] in. in diameter. The boiler will have a working pressure of [illegible] lbs. per square inch. The tender, carrying [illegible] gallons of water and three tons of coal, will run upon the two four-wheeled bogies, the total weight of the locomotive, when in working order, being about [illegible] tons.

Local Shipbuilding.

Work is now in full swing in most of the local shipbuilding yards. In all, there are approximately 196 vessels in construction at the ports of the Tyne, Wear, West Hartlepool, and the Tees. A number of the firms have already booked up sufficient work to last them well into next year. Other builders are not quite so well placed; but work will be brisk until towards the next winter. In the meantime it is to be expected that more orders will be booked, though at the higher prices that now prevail they are not placed very freely. Still for some time ahead work will be plentiful, and prospects fair.

New Steamship Orders.

On the subject of the order for new steamships intended for the service of the Dominion Steel Company, it is stated the company have entered into negotiations with two well-known Norwegian shipping firms to charter seven steamers over a prolonged period provided that the boats are built to their specification to suit their particular trade. These conditions have been agreed to, and the firms mentioned have, therefore, placed with Sir Raylton Dixon and Company, of Middlesbrough, an order for the vessels, which are each to be of from 7,000 to [illegible] tons burden.

Yorkshire District.

SHEFFIELD.

Business Prospects.

In the iron branches the general condition of affairs points to plenty of work still on hand, and for future contracts advanced rates are being asked. Prices are firm in the Bessemer and Siemens' branches, but there is no particular increase in the quantity of work in hand, although manufacturers have [illegible] every reason to be satisfied with the fact that as old contracts run off, new ones come forward to take their place. In the crucible steel branch of the trade, the demand is still below the limit of output, but of the cheaper class of steel, used in the production of [illegible], [illegible], and other [illegible], an immense tonnage is being used, and in the lighter forgings a fairly good business is reported. There is nothing, however, to record in the departments devoted to railway materials, a lull having set in after the orders which were recently recorded in the reports of home railway companies. Orders [illegible] efforts are being made to secure Sheffield's share of the work, [illegible]. There [illegible] demand for [illegible] in connection with [illegible] quiet.

Steam Coal.

The supply of steam coal [illegible] one of the best features of local trade. The Humber shipping ports are taking good quantities, and local works [illegible]. Prices [illegible] showing [illegible] per ton upon those [illegible]. Nothing further has been heard of the [illegible] South Yorkshire [illegible] south.

[illegible] Sheffield which have entered into arrangements with both the Midland and Great Central Railways for the whole year are sending as much as they can spare, the stipulated weekly tonnage being in practically every case exceeded.

A Bridge over the Don.

The Lancashire and Yorkshire branch from the Dearne Valley Railway to the Denaby Main Colliery at Conisborough, has necessitated a new three-span bridge over the River Don. The centre span is 106 ft. with two small side spans. The work of getting the main girders into position has just been carried out under the superintendence of Mr. D. C. Rattray, chief engineer of the Lancashire and Yorkshire Railway, Mr. R. H. Clayton being the resident engineer. The contractors are Messrs. Gates and Hogg, and the sub-contractors for the steelwork Messrs. Francis Morton and Co., Ltd., Liverpool. The bridge is being erected by Messrs. J. H. and W. Bell, Ltd., Liverpool.

File Cutting Machine.

Messrs. Lockwood Bros., of Sheffield, have just completed an improved file-cutting machine, for which some important advantages are claimed, among them being an arrangement where by the carriage bed is said to be made secure and steady. All danger of [illegible] in the [illegible] of the file is said to have been obviated, and it is stated that the machine [illegible] improved [illegible] faster and have a larger output at the same cost of maintenance.

The New Cunarders.

A good deal of interest is being taken at Sheffield in the work which is going forward at Messrs. John Brown and Co.'s for the twenty-five-knot express Cunarder which they are building at Clydebank, and the heavier parts of the turbines that are to be [illegible] have for some months been engaging attention. A few days ago what is stated to have been a record [illegible] was made [illegible] turbine drums.

Lancashire District.

MANCHESTER

Iron and Coal Trades.

Those engaged in the iron trade are lamenting the change that has come over the position as compared with a month ago. Prices at the moment must be looked upon as more or less nominal, and the reaction has probably been overdone. There is a slackness not only of actual business but of inquiry. The hematite trade at Barrow is still weak, but the process of realisation is probably reaching an end, and the market will, it is hoped, be shortly subjected to more stimulating influences. Makers, at all events, are by no means disposed to follow the downward course of quotations, and are still quoting over 71s. for mixed Bessemer numbers. There is also to be noted a tendency to believe that the fall in the price of pig iron is going to benefit the steel rail trade, which, as noted in our last issue, has been somewhat stifled by the high price of raw materials. The best business at the moment is being done in shipbuilding steel, the mills being very busy. Merchant steel is in only moderate demand. Finished iron shows little or no change. The coal market is steady, and business is inclined to improve, slack and manufacturing descriptions being in fair request.

Precision Grinding Machine.

The name of Beyer, Peacock and Co., Ltd., is familiar in connection with precision grinding machines, of which several types are now in successful operation. One of the best of these machines is the expansion link grinding machine. The tool is described as intended for either straight or radial links and blocks and for truing holes in case-hardened work generally. It will grind out holes [illegible] in. to $1\frac{1}{4}$ in. diameter by 4 in. deep, or $1\frac{1}{4}$ in. to 3 in. diameter by [illegible] in. deep, or 3 in. to 5 in. diameter by [illegible] in. deep. The grinding headstock is carried on a bed with vee guides, and is adjustable by screw and hand-wheels lengthwise and also crosswise. The main table has tee grooves the full length, and rests with the extension on cabinet standards as illustrated. The main table carries a traverse table which has a self-acting cross traverse extending to [illegible] ft. It carries in addition a radius bar, which is adjustably centred. By means of this the maximum radius obtainable is [illegible] ft. For grinding straight links the radius bar is taken away, and the cross motion is obtained by fastening to the main table vee strips which guide the traverse table. The spindle, of tool steel, runs in gun-metal bearings. It has a traverse on the bed lengthwise of [illegible] ft. [illegible] in., and also has a variable self-acting vertical traverse. Then, besides revolving on its own axis, it has a variable self-acting eccentric motion to the extent of [illegible] in. As in other machines of the same type, this is provided by a system of eccentric sleeves driven by worm and worm wheel. The spindle is belt-driven, with a compensating device for taking up the slack, and, being balanced, can easily be withdrawn from the hole as may be required for gauging. The total weight of the machine is about [illegible] cwts.

A Proposed New Shipbuilding Centre.

At a meeting of the Southport Chamber of Commerce on Monday, Mr. Samuel Hardman discussed the advantages of linking the railway systems of Southport and the Fylde district, the suggested [illegible] port at Banks, and the development of the estuary of the Ribble as a shipping and shipbuilding centre. He advocates the construction of a new line from Wigan, through Rufford to Banks, then by a tunnelled branch in front of Southport to the [illegible] Lines Extension Railway on the one hand, and a line across the sands and estuary on the other, giving access to Lytham, St. Annes, and Blackpool. The crossing of the Ribble would be effected by means of a bridge of [illegible] span, this being the distance between the training walls, with a headway of [illegible] ft., or alternatively a swing bridge, or by means of a tunnel. The conditions for the construction of a dock at Banks were, Mr. [illegible] considered, very favourable. It was suggested that the probable cost of a new dock of ten acres, with complete equipments, would be [illegible]. Crossens would retain the coal trade of the estuary, and obtain all Fleetwood shipments and quite two-thirds of the coal shipped at Garston: also all mining and other timber would come into Crossens instead of Liverpool and Garston. Then all incoming ores from Bilbao would use Crossens. Assuming a railway were built from Wigan to Banks, they would have by the above scheme, a fine sea outlet for coasting traffic to Ireland, the Isle of Man, and Scotland.

The New Cunard Turbines.

The Cunard Company have decided to name the two new fast turbine steamers now being built for the company, under the agreement with His Majesty's Government, by Messrs. John Brown and Co., Ltd., Clydebank, and Messrs. Swan, Hunter, and Wigham Richardson, Ltd., Wallsend, *Lusitania* and *Mauretania* respectively.

The Zoelly Turbine.

Messrs. Mather and Platt, Ltd., have decided, after careful investigation, to manufacture the Zoelly patent turbine, which they believe realises the highest economy of any steam prime mover. This type of turbine has already been largely adopted on the continent, and is being manufactured by Messrs. Escher Wyss and Co., Messrs. Krupp, of Essen, the Maschinenfabrik of Augsburg and Nürnberg, the North German Lloyd, and the Siemens-Schuckert Company, and Messrs. Schneider of Creuzot. At the present time there are at work or under construction turbines of the Zoelly type [illegible]. A special feature of the design is the great strength of the blades and the security of their attachment to the wheels. Moreover, this turbine being of the impulse type, in which small clearances are not essential, all risk of the stripping of the blades is obviated.

Wages of Skilled Artisans.

In [illegible] paper read on Saturday before the Manchester Association of Engineers by Messrs. W. H. [illegible] and Joseph H. [illegible] [illegible] interesting account was given of the [illegible] [illegible] in the [illegible] industry. Perhaps the most [illegible] section of the paper was that dealing with the reduction in cost of machinery, the authors quoting figures which illustrated the advance made in the reduction of outlay on plant, and the improved conditions of the skilled operatives in the engineering and shipbuilding trades. The following table gives [illegible] hours worked and wages paid in the two periods [illegible]. From this it will be seen that, notwithstanding the fewer working hours and the increased rate of wages, the average increase is equal to 24 per cent. Other details are disclosed in the figures given.

TABLE I. Hours Worked and Average Wages Paid to Skilled Artisans in Manchester District

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Pattern Makers ..	[illegible]	[illegible]	[illegible] 0	[illegible] 0
[illegible]	[illegible]4 0	34 0	[illegible] 0	[illegible] 0
[illegible]	[illegible]2 0	28 0	[illegible] 0	34 0
[illegible]	[illegible]2 0	28 0	[illegible]	34 0
[illegible]	[illegible]2 0	28 [illegible]	[illegible]	[illegible]1 0
[illegible]		[illegible]	[illegible]	36 0
[illegible]		[illegible]		34 0
Average ..	[illegible]	[illegible]	[illegible]	36 0

Power Charges in Manchester.

The electricity committee of the Manchester Corporation have decided to rearrange and reduce the charges for current for power. At present the charges are based upon the units consumed per quarter [illegible] consumers' maximum demand, beginning with [illegible]d. per unit for less than [illegible] units per kw. [illegible], and ending with [illegible]d. per unit for [illegible] units per kw. and upwards. The committee propose to charge [illegible]d. per unit for less than [illegible] units per [illegible] per quarter, and 1d. per unit for [illegible], to operate from March [illegible]. If the [illegible] is adopted the committee recommend [illegible] minimum charge for power [illegible]s. 6d. per quarter, this minimum to apply to [illegible].

New Secondary School.

A [illegible] school [illegible] at Blackpool [illegible]. [illegible] building [illegible] has been erected [illegible]. The [illegible] address was [illegible] Vice-Chancellor of [illegible] University, Manchester.

The Midlands.

BIRMINGHAM.

Trade Outlook.

In the Midlands as a whole trade is decidedly on the balance, and a very little thing would be required to turn it sharply in either direction. At present there is little to indicate that the turn will be upwards. There has been very little buying for the last six weeks, and in all branches of trade there are many manufacturers who are getting within sight of the end of their contracts, and will soon be anxious to see new ones coming forward. All are not in this position—there are others who will not need to trouble much this side of midsummer if specifications are forthcoming regularly—but the position of the minority no doubt will have most influence on prices. Already it is recognised that latest quotations are largely impracticable, and that if there were business offering it would be placed at not more than old prices. How long it will be before this is recognised in quoted rates remains to be seen.

Wolverhampton Iron.

Somewhat quieter business is recorded during the past week in the demand for iron, although some improvement in steel business is to be noted. As a matter of fact, however, the manufacturers of bar-iron are not pushing for orders, as they have enough work in hand to go on with. The mills and forges are working full time, with the exception of those mills which rely on supplies of foreign sheet bars for rolling down, of which deliveries are in arrear. A steady business is reported for hoops, tank plates, and stamping sheets, and steel bars and plates are in good request. Good orders from Scotland and South Wales are reported by roll-founders, but makers of black sheets are less busy, and there is a tendency on the part of consumers to renew contracts only at lower rates. The pig-iron makers are, of course, sold well ahead, and electrical engineers are doing an exceedingly good trade.

Unmarked Bar Association.

The adjourned meeting of the newly formed Midland Unmarked Bar Association was held on February 2nd at the Midland Hotel, Birmingham, Mr. E. Parkes, M.P., presiding. The meeting had been fixed a month ago, when iron was buoyant and an advance in the list was generally expected. The ironmasters of North Staffordshire, Lancashire, and South Yorkshire would, it is fully understood, have been prepared to take similar action, so that common bar iron prices in all these districts would have coincided. The trade reaction, however, has stopped all this. Instead of advancing, bar iron is weaker, and all other departments of rolled iron with them. The Midland Association deemed it inadvisable, therefore, to enhance values, although it was decided to maintain the present minimum of [illegible] for contracts accompanied by specifications. The agreement with other districts still subsists, though competition is somewhat keener than a month ago.

Bar Iron Prices.

The latest news goes to show that the efforts of the New Midland Unmarked Bar Iron Association to maintain the basis prices referred to above have not been successful. There has been not a little underselling, and this has resulted in a sharp fall in values. Some of the smaller firms whose contracts have run out are said to be offering common bars at the [illegible], but these [illegible] during the past few months Belgian bar manufacturers have secured large Midland contracts [illegible]. Some firms who produce reliable merchant qualities are still quoting the price of [illegible], which the Association determined to maintain, but it is understood that very little business is being done at this figure.

E. J. Wrigley and Co.'s Extension of Works.

A much needed extension has been made to the works of Messrs. E. J. Wrigley and Co., Ltd. The works are busy in every department, but particularly with specialities in motor gearing and high speed twist drills. The additions include a fully equipped laboratory for testing all classes of steel used in their manufacture, in order to ensure the highest quality of material.

Quite a feature of the new premises is the excellent lavatory accommodation for the men. Each man has a separate locker in the cloak room; clean towels and eating utensils are also provided. The firm believe that such provision is the truest economy, and that the cost is more than justified by the result.

New Dock and Harbour Works.

A new harbour improvement scheme is now being carried out at [illegible]. The scheme which is now approved contemplates an extension of the piers for [illegible] ft., with a minimum depth of [illegible] ft. at low water. Messrs. Price, Wills and Reeves, the contractors, who have undertaken the construction of a new deep water dock at Immingham, have been instructed to proceed at once with the first part of the scheme, which provides for a light railway between Grimsby and the dock site. The work will be pushed on with all speed, as the line is needed for the conveyance of material. It is stated that [illegible] men will be engaged for four years in the construction of the dock.

Gift to Birmingham University.

Vice-Chancellor Beale, at the annual Court meeting at Birmingham University, on Wednesday, said th [illegible] anonymous gift of [illegible] would be used for extending the new university buildings.

Trade of Derby.

The annual report of the Derby Chamber of Commerce, just issued, states that, speaking generally, [illegible] in the iron and steel trade have [illegible]

Wales.

A Deadlock.

The metal trade remains dull, and little business is reported, the condition of the trade being such that no transactions either in buying or selling are being done—on the one side, the manufacturer cannot produce at anything like the cost to enable sales being made without resulting in serious loss; on the other hand, buyers are holding off with a view of lower prices prevailing. The strength of the coal market has been well maintained. The undertone is more healthy than ever, and inquiries are reaching the collieries from many of the distant markets. The increasing demand for Welsh steam coal in South America is exemplified by a railway order of an exceptional character which has just been placed for the supply of 30,000 tons between March and September. Far Eastern merchants are also in the market, and purchases have been made on West Indian account. Coming on an already firm coal market these orders have considerably accentuated the strong position.

South Wales Industries.

As noted above, the coal trade in South Wales has exhibited fresh strength, and prices show a considerable advance upon those recently current. The explanation is that there has been strong buying in a market where the demand is for the time being, in excess of the supply, so that sellers are able to dictate terms. There is this additional fact to be noted, that there is a plentiful volume of tonnage in stock. The demand for finished iron and steel has fallen off, and works are not fully employed. The dispute on the wage question is referred to in another place. There is also a lull in the tinplate trade which points to a lessened make in the immediate future.

Steel Workers' Wages.

At Swansea, on Tuesday last, an adjourned conference of the representatives of steel workers and members of the Steel Smelters' Union, was held to endeavour to arrange a uniform rate for teamers, ladlemen, and ladlemen's helpers at Siemens' steel furnaces. After considerable discussion a uniform rate was established for teamers and ladlemen. The rates fixed will give [illegible]. The men at some works will also get an advance, but the men at one or two other works will slightly suffer in making the rates uniform. The new rates are to come into force on April 1st.

SWANSEA.

Shipbuilding Revival.

[illegible] South Wales has been the [illegible] ship-repairing yards, and this has gone on side by side with a revival of the shipbuilding industry itself. [illegible] under construction at the Cardiff Channel and the Mount Stuart Dry Docks to the order of Messrs. Spiller and Bakers, Cardiff. The barges, all of which are intended for use in the Bute Docks for the transport of grain and flour to and from vessels, are 75 ft. long, 14 ft. beam, and 7 ft. deep. They are built throughout of ¼ in. steel plates supplied by the Cardiff Dowlais works of Messrs. Guest, Keen, Nettlefold and Co., and contain two watertight bulkheads. They will [illegible]

Cammell Laird's and South Wales

There has been a rumour in Cardiff [illegible] which has been circulated on more than one occasion previously, as to the impending removal of Messrs. Cammell, Laird and Co. to South Wales. [illegible] Messrs. Cammell, Laird are, at the present moment, further extending their works at Sheffield.

Mechanical Engineers' Visit to Cardiff.

The Institution of Mechanical Engineers has, as already stated, accepted an invitation to hold their next summer's meeting at Cardiff, and the date has been fixed for the week commencing July 30th next. A meeting of the Reception Committee, comprising the local members of the institution, was [illegible] visits to works, etc. Sir Wm. Thomas Lewis, Bart., has accepted the [illegible] Committee, and a number of well-known and influential gentlemen [illegible] secretaries are [illegible] and Mr. D. E. Roberts.

Newport Waterworks.

The Mayor and Corporation of Newport have [illegible] the borough is derived. [illegible] taking from the [illegible] with [illegible] undertaking were transferred the Parlia[illegible] [illegible] obtained in the previous year by the [illegible] to construct a new reservoir at W[illegible]. The scheme is what is known as [illegible] scheme, the drainage area comprising [illegible] of land. Water is drawn into [illegible] from the Llanvaches and New[illegible], and the Castroggy and Nantypridd [illegible], two and a half miles long, which has a discharging capacity of [illegible] gallons of water a day at the lower [illegible]. In addition to the W[illegible] reservoir, [illegible] supplies, viz., the Ynysyfro reservoir, [illegible] in the same [illegible] and the Pant[illegible] reservoir, all [illegible] gallons of water.

Ireland.

BELFAST.

Belfast Association of Engineers.

[illegible]ion, which has been known for fourteen [illegible] the Belfast Mechanical and Engineering [illegible] held its annual re-union at Belfast on [illegible] evening last under the presidency of Mr. A. W. Hamilton, when the company present in[illegible] [illegible] C. Forth, the president of the Municipal Technical Institution. The report of the institution indicates that it is making satis[illegible], and Mr. Forth, in moving its [illegible] pointed out that the Belfast Corporation [illegible] in the new technical institution an [illegible] for the study of engineering second [illegible] in the United Kingdom. The papers [illegible] in the immediate future are "Mechanical [illegible] applied to Textile Machinery" and "[illegible] Construction," and a reference to the [illegible] of the institution for the winter session shows that in several directions new ground has been broken.

The Fifty-hour Working Week.

The change which Messrs. Davidson and Co., Ltd., of the Sirocco Engineering Works, have made in the working day of their establishment is one [illegible] which will be watched with keen [illegible]. W[illegible] to sacrifice four hours in the week's time-table, bringing it down to [illegible] hours working week. At the meeting of the representatives of the firm and of their workmen on Saturday last, Mr. S. C. Davidson expressed the belief that, though the reduction in the hours would [illegible] by [illegible] corresponding reduction in wages, it would not result in any loss to the firm in the amount of work [illegible] weekly, and that [illegible] more effective [illegible] would ensure a better average [illegible] in the work.

New Harland and Wolff Steamer.

On Saturday last the [illegible] an addition to the R.M.S.P. fleet engaged in South American trade, was launched from the yard of Messrs. Harland and Wolff. [illegible] dimensions are: Length, [illegible] ft., with a gross register of [illegible] provision has been made for the safe navigation of the steamer, and by the adoption of Messrs. Harland and Wolff's latest "balanced" quadruple type of engines vibration is reduced to a minimum. The double set of engines for the twin screws constitutes, of course, an additional element of safety.

Latest Wills.

A[illegible] aged 70, of Westbury [illegible], Durdham Downs, Bristol, engineer [illegible] founder, of the firm of Messrs. [illegible] and Sons, of [illegible] Street, Bristol .. .. [illegible]

W. [illegible], of Rowallan, Larkhall, [illegible] engineer, of 7[illegible], Welling[illegible] Street, Glasgow, who died on August [illegible] .. .. [illegible]

[illegible] Annfield Road, Liverpool [illegible] .. .. [illegible]

[illegible] Newcastle-upon-Tyne [illegible] chairman of the [illegible] .. [illegible]

[illegible] Company, Ltd. [illegible] [illegible]

[illegible] .. [illegible]

[illegible] .. .. .. [illegible]

Contractors' News.

This list only contains contracts, particulars of which have not been previously published. For particulars of other contracts, see recent issues of "Page's Weekly," and small advertisements, pages 6 and 7. We shall be pleased to insert under this column, free of charge, particulars of open contracts.

Contracts Open.

United Kingdom.

Bristol.—Tenders for arc lamp carbons. Mr. H. [illegible] Proctor, [illegible] electrical engineer [illegible]

Barnes. Supply [illegible] type water [illegible] condenser, feed pump and pipe work. Mr. [illegible] Davidson [illegible] Mortlake, S.W. [illegible]

Edinburgh. [illegible] pavement [illegible] meters [illegible] Mr. Frank A. Newmarch [illegible] place, Edinburgh [illegible]

Hamilton. [illegible] iron pipes and relative special castings, for the District Committee of the Middle Ward of the County of Lanark. [illegible]

Horsforth. [illegible]

Huddersfield. [illegible] Committee .. .. .. [illegible]

Leeds. [illegible]

Lincoln. [illegible] dynamo, for the Corporation [illegible]

Londonderry.—Supply of [illegible] ty department for one [illegible] (Mr. R. V. [illegible]

Manchester. [illegible]

Newton-in-Makerfield. [illegible] District Council [illegible] Town Council [illegible]

[illegible]

Merthyr Tydfil [illegible] steel- [illegible] Hill, Merthyr Tydfil .. [illegible] Mar. [illegible]

Nottingham [illegible] Mr. W. B. [illegible] Nottingham [illegible] Mar. [illegible]

Oswaldtwistle [illegible] Mr. R. N. Hunter, Town Hall, Oswaldtwistle .. Mar. [illegible]

Padiham. [illegible] Mar. [illegible]

Poole [illegible] cast-iron [illegible] Mr. [illegible] Mar. [illegible]

Pontypridd. [illegible] .. Mar. [illegible]

Portsmouth. [illegible]

Sheffield. [illegible] W. Morrison, Commercial Street .. .. Mar. [illegible]

Shoreditch London [illegible] Mar. [illegible]

Sleaford. [illegible]

Stockport. [illegible]

Last Day

Stoke-on-Trent.—The Corporation invite tenders for electricity meters. Borough Electrical Engineer .. Mar. [illegible]

Swansea.—Supply of such quantities of [illegible] iron pipes and castings, steel tubes, water-meters, hydrants, valves and pig lead as they may require during [illegible] months for the Swansea Town Council. The Waterworks Engineer, Guildhall, Swansea .. .. Mar. 3

Swindon.—Various materials for the electricity and tramways department .. .. .. Mar

Wimbledon.—Supply of stores and materials for the Corporation electricity department including cables, joint boxes, transformers and meters .. .. Ma

Abroad.

Antwerp.—For the provision of heating apparatus for the New Flemish Lyrical Theatre. Guarantee, 6,000 francs. Specification and plans to be had from the secretary, Town Hall, Antwerp .. Mar. [illegible]

Antwerp.—Construction of a lock at Malines, estimated cost, £45,525. Rue des Augustins 15, Brussels .. Mar. 1[illegible]

Brussels.—Supply of fifteen turntables of 1[illegible] metres in diameter for locomotives. M. de Rudder, Administrateur des Voies et Travaux, 11, Rue de Louvain, Brussels .. Mar. 7

Brussels.—Works at Onoz including three steam engines and pumps. Compagnie Internationale des Eaux de l'Agglomeration Bruxelloise, Rue du Trône [illegible] .. Mar. 14

Christiania.—Supplies to the Norwegian State Railways for [illegible] tons of best soft locomotive coal. Commercial Intelligence Branch of the Board of Trade, 73, Basinghall Street, E.C. Ma[illegible]

Egypt.—Supply to the Sudan Government for the use of the Khartoum Light Railway, of steel rails, steel sleepers, clips and bolts, fishplates, switch points, locomotives, rolling stock, and turntable. Lieut.-Col. J. H. Western, R.E., Queen Anne's Chambers, Westminster, S.W. Mar. 5

Johannesburg.—Supply, free of [illegible], to the municipal stores of 350 street lamp fittings [illegible] and [illegible] barrel. Town clerk. Mar. 3

Lisbon.—Construction of iron bridge (about £1,200). Direccao de Minho e Douro May 2[illegible]

Madrid.—The State Telegraph Department invite tenders for the supply of [illegible] tons of plate of copper Mar. [illegible]

Madrid.—Supply of [illegible] zinc cylinders for Calland pile. Chief telegraph office, 10, Carretas, Madrid .. .. Mar.

Madrid.—Concession to construct and work a railway from Val de Zafán to Tortosa or San Carlos de la Rapita Mar. [illegible]

Madrid.—The Direccion-General de Obras Publicas invite tenders for an electric railway project in [illegible] Mar.

Madrid.—[illegible] electric tramway in Madrid. Directorate-General of Public Works .. April [illegible]

Manila.—Construction of two steel breakwaters. Harbour Works Manager .. .. .. April [illegible]

Montevideo.—Complete installation of Cerro de Montevideo lighthouse, of nine gaslit buoys and of gas works. Ministerio de Fomento .. May [illegible]

Muenster.—Supply of electric light and power equipments to the [illegible] Railway. Director of the State Railways .. Mar [illegible]

Pilsen.—The Austrian State Railways invite tenders for the electric lighting of the station in Pilsen .. .. Mar [illegible]

Pretoria (Transvaal).—Supply and erection of a refuse destructor, for the municipality. Messrs. Mosenthal, Sons and Co., 72, Basinghall Street, E.C. .. .. Mar. [illegible]5

Rosario.—Public electric lighting. Municipal authorities, Rosario, Argentine .. .. April [illegible]

Spain.—Municipality of [illegible] require a steam roller and a road scraper at the estimated cost of £[illegible]. Commercial Intelligence Branch of the Board of Trade .. .. Mar. 16

Sydney (New South Wales).—Supply and erection of (a) boilers, automatic stokers, pipe-work, etc.; (b) turbo-alternator, sub-station machinery, switchboards, etc. Town Clerk. .. .. May

Talcahuano.—Construction of floating steel dock of [illegible] tons displacement. Direccion del Material, Valparaiso .. .. May 1

Terralba (Italy).—Municipal waterworks. Estimated cost [illegible] .. .. Mar. 8

Valparaiso.—Harbour works, estimated cost 33,[illegible] pesos. Minister of Finance, Santiago .. .. April 25

Coming Contracts.

Bridgwater.—A Local Government Board inquiry has been held into an application of the Corporation for sanction to borrow [illegible] for works of sewerage.

Buckley.—The Urban District Council have concluded an agreement with Mr. [illegible], engineer, of Birmingham, for the survey and report of a drainage scheme for the district [illegible].

China.—The Board of [illegible] and the Viceroy of Canton have decided to build a railway between [illegible] and Canton and have commenced investigations [illegible] the route of the line.

Cuba.—The [illegible] constructing and repairing [illegible] telegraph installations [illegible] sanctioned.

Dover.—An additional [illegible] purchased for the [illegible]. Application to borrow the money has been made.

Fraserburgh (N.B.).—The Harbour Commissioners [illegible]

Glasgow.—The Corporation [illegible] of the Secretary for Scotland [illegible] for additional electric supply works.

Gravesend.—An [illegible] recently [illegible] into the application of the Council for power to borrow [illegible] for extending [illegible] undertaking.

Hebden Bridge.—An [illegible] Corporation's application [illegible] for electric supply purposes.

Hereford.—The Town [illegible] Local Government Board [illegible] for mains extensions.

Italy.—[illegible] communal [illegible] commission to [illegible] system of railway or electric [illegible] district. An association has been formed amongst the [illegible] communes of [illegible] between Ancona and Loreto.

Kent.—The County Council have been asked to purchase [illegible] motor engines [illegible]

Macclesfield.—The Water [illegible] to provide piping in connection with the water supply [illegible]

Mold.—The authority has dec[illegible] a drainage scheme.

Peru.—[illegible] construction [illegible] Puquio and Coracora.

Portsmouth.—Estimates [illegible] submitted to Parliament [illegible] said, will amount to about 2½ millions sterling.

Stoke-on-Trent.—The Electricity Committee [illegible] that application [illegible] Local Government Board for sanction to borrow £5,748 for the additional power plant.

Torquay.—The Local Government Board [illegible] inquiry into the Corporation's application [illegible]

Truro.—The water [illegible] to commence the construction of a new [illegible] and filter beds.

West Ham.—The [illegible]

Willesborough.—A [illegible] Rural District [illegible]

Contracts Closed.

Birmingham.—[illegible]

Brighton.—[illegible]

Dalmuir.—[illegible] Dalmuir. [illegible]

Darlington.—Messrs. [illegible] coupled bo[illegible] and also [illegible] Railway.

Durban.—[illegible]

Epsom.—[illegible]

Grimsby.—[illegible]

Leeds.—Messrs. [illegible] years.

Lincoln.—Messrs. Rust[illegible] placed an order with Royce, Ltd., Man[illegible]

Liverpool.—Messrs. C. and A. Musker, Ltd., have secured [illegible] Goliath crane [illegible] station [illegible] Messrs. Mitchell Cotts a[illegible] their three-mould patented hydraulic flag-making plants.

London.—[illegible]

London.—[illegible]

Manchester.—The Corporation Electricity Department [illegible]

Motherwell.—[illegible]

Newcastle.—[illegible]nsion [illegible]

Preston.—[illegible]

Renfrew.—[illegible] colonial [illegible]

Rochester. [illegible] Kent [illegible] Dick, Kerr [illegible] George [illegible]

Salford [illegible] Leyton Co. [illegible]

Singapore [illegible] Ltd. [illegible] sterling.

Shipbuilding Contracts.—The Pacific St[illegible] with Messrs. Willi[illegible] Ltd. [illegible] Westmorland [illegible] ft. long [illegible] carry a load of 3,400 tons [illegible] Stephen and Sons [illegible] W. Henderson and Co. [illegible] an order from Messrs. Maclay and [illegible] to build and engine [illegible] tons carrying capacity. Messrs. [illegible] Paisley [illegible] Conservancy [illegible] bucket ladder dredger and four steam [illegible] the dredger will [illegible] each [illegible] Iron and [illegible] William Sloan [illegible] Glasgow [illegible] steamer of about [illegible] Messrs. [illegible] and Jackson [illegible] Messrs. Hepple [illegible] to build [illegible] trade, to carry about [illegible] North [illegible] built for the [illegible]

Sunderland.—The Corporation have [illegible] Manchester, for four boilers.

Swansea. [illegible] Jones [illegible] West Pier [illegible] the contractors for [illegible]

Taunton. [illegible] to [illegible] Electric Light and Power Company.

The Rand [illegible] placed an order with the [illegible] Westinghouse Co. for electrical plant.

Japan. [illegible] Machinery Company [illegible]

Appointments Vacant.

Harrogate [illegible] Mr. J. [illegible]

India. [illegible] State for India [illegible] Public Works Department [illegible] candidates must not [illegible]

London [illegible] for the [illegible] tertain- [illegible] chief [illegible] Salary [illegible] Council, [illegible] S.W. [illegible]

Malay States [illegible] Railway [illegible]

India. [illegible] require [illegible] estimates [illegible] training in the [illegible] of a British [illegible] month. T. W. Wood, secretary, [illegible] Street [illegible]

Appointments Filled.

Birmingham.—Col. F. W. J. Barker, Retired List R.A., [illegible] appointment of [illegible] Factory, Birmingham [illegible]

Cape Town [illegible] University.

Greenwich [illegible]

Nottingham. [illegible]

Transvaal [illegible] town [illegible]

Walthamstow [illegible] Council [illegible]

India.—[illegible] M.M. [illegible] G.M. [illegible]

India.—[illegible] appointed [illegible] Central Indian [illegible]

Share List of Engineering, Electrical, Iron and Steel, and other Companies.

The following is a comprehensive list of Companies in the industries covered by "Page's Weekly," in which shares business is being currently transacted. Additions will be made from time to time as occasion requires. We desire it to be understood that while our Share List will generally be found correct, we do not hold ourselves responsible for any loss or inconvenience that may arise from possible inaccuracies.

STOCK EXCHANGE SETTLING DAYS.—Settling days on the Stock Exchange are as follows:—
Consols: April 4th. General Settlement: March 9th, 28th; April 17th. Bank Rate, September 28th, 1905, 4 per cent.

Engineering, Iron, and Steel Companies.

Present Amount subscribed	Shares	Last Dividend	Name	Paid up	Closing Prices
11,370	[illegible]	5%	Alldays & Onions Pneumatic Engineering, Ltd	3	2[illegible]—3¾
10,000	5	3/-	Do. Cum. Pref. 6 per cent. ..	5	4[illegible]—[illegible]
£80,000	Stk	4½%	Do. Mort. Deb. 4½%	100	99—101
65,000	1	5½%	Alley and MacLellan, Ltd. 5½% Cum. Pref. Nos. 1—65,000	1	19/0—20/0
3,210,000	1	1/-	Armstrong (Sir W. G.), Whitworth and Co., Ltd.	1	[illegible]
76,970	5	2/-	Do. 4% Cum. Pref..	5	[illegible]
1,500,000	100	4%	Do. 4% 1st Mort. Dbs. Rd.	100	102—104
15,000	10	4½%	Arrol (Sir William) & Co., Ltd. 4½% Cum. Pref., Nos. 1-15,000	10	10—10[illegible]
7,000	10	2½	Austin [illegible] & Son, Ltd [illegible] Cum. Pref.	all	[illegible]
70,000	100	2	Do. 4% 1st Mort. Deb. ..	100	[illegible]
£100,000	100	4½%	Aveling and Porter, Ltd., 4½%, Reg. Mt. Debs. Red.	100	[illegible]4—[illegible]7
166,625	5	10%	Avery (W. & T.), Ltd.	5	10—10½
124,835	5	5%	Do. Cum. Pref. 5%	5	[illegible]—6½
100,000	Stk	4%	Do. Deb. 4%	100	100—105
£800,000	1	1/7½	Babcock and Wilcox, Ltd., Ord. ..	1	3[illegible]—4[illegible]
100,000	1	7½d.	Do. 6% Cum. Pref.	1	1[illegible]—1[illegible]
20,000	1	5%	Bagnall (John) & Son, Ltd ..	1	16/0—17/6
20,000	5	3/-	Baker (Joseph) and Sons, Ltd. 6% Cum. Pref.	5	[illegible]
250,000	1	6½d.	Baldwins, Ltd., 5½% Cum. Pref. ..	1	[illegible]
£250,000	Stk	4½%	Do. 1st Mt. 4½% Deb. Stk. Red.	100	101—103
150,000	4½	[illegible]	Barrow Hæmatite Steel Co., Ld., O.	4½	[illegible]
50,000	4½	3	Do. do. Cum 2nd. Pref.	4½	[illegible]
166,670	5	5	Bayliss, Jones and Bayliss, Ltd., 5% Cum. Pref. Shares ..	5	4—[illegible]
£500,000	100	4½	Beardmore (Wm.) & Co., Ltd., 4½ 1st Mt. Debs., Red., Scrip 50% pd	—	100—10[illegible]
50,000	10	6/-	Bell Brothers, Ltd., 6% Cum. Pref.	10	12[illegible]—12[illegible]
£700,000	Stk	4%	Do. 4% Deb. Stock, Red.	100	100—10[illegible]
128,320	10	5%	Belliss and Morcom, Ltd	10	11½—12
50,000	Stk	4	Do. Mort. Deb. 4%	100	100—104
17,[illegible]	10	2½	Blyth Shipbuilding Co., Ltd.	[illegible]	[illegible]
1,629,760	1	6d.	Bolckow, Vaughan and Co., Ltd., O. Nos. 1-1,629,760	1	[illegible]
1,8[illegible]	1	3/3	Do. Nos. 1,639,101-3,500,000	12/	12/0—12/9
[illegible]	10	5	Bow, M'Lachlan & Co., Ltd., [illegible] Cum. Pref. Nos. 1-[illegible]	10	[illegible]—10
£[illegible]	15	22/6	Briggs (Henry) Son & Co., Ltd. "A"	15	30—32
	1	15/-	Do. do. "B"	1[illegible]	21—22
[illegible]		[illegible]	Brewett [illegible] & Co. [illegible]	1	4/0—4/6
50,000	1	6	Do. 6% Cum. Pref...	1	8/3—8/[illegible]
1,160,000	1	[illegible]	Brown (John) and Co., Ltd., Ord., Nos. 1-1,160,000	1[illegible]	1¼—1[illegible]
500,000	1	6d.	Do. Ord., Nos. 1,160,001-1,770,000	1	1[illegible]—1
74,000	10	5/-	Do. [illegible] Cum. Pref.	10	[illegible]
[illegible],724	[illegible]	2/-	Cammell, Laird & Co., Ltd., Ord..	[illegible]	[illegible]
215,045	[illegible]	2/6	Do. 5% Cum. Pref. ..	5	[illegible]
[illegible]00,000	Stk	4	Do. Mort. Deb.	100	[illegible]
400,000	Stk	4½	Do. Mort. Deb.	100	[illegible]—107
1,[illegible]	1	—	[illegible]	1	[illegible]
[illegible]	Stk.		Do. [illegible] Mort. Deb.	[illegible]	[illegible]
11,[illegible]	10	-	[illegible]	[illegible]	[illegible]
40,[illegible]			[illegible], Ltd. [illegible]		
[illegible]	1	[illegible]	[illegible] Electrical Stores [illegible]	1	[illegible]
10[illegible]	100	[illegible]	[illegible] 1st Mort. Deb.	[illegible]	[illegible]
45,[illegible]	1	[illegible]	[illegible] Ltd. Ord.	[illegible]	[illegible]
70,000		2/6	Do. [illegible]	[illegible]	[illegible]
£[illegible]	S[illegible]	4	[illegible]	100	[illegible]
50,000	1	[illegible]	[illegible]	1	[illegible]
[illegible]	1	7½	Do [illegible]	1	[illegible]
100,[illegible]	10	30	[illegible]	7½	[illegible]
57,[illegible]	10	10/-	[illegible]	1	[illegible]
40,[illegible]	10	[illegible]	Do. [illegible]	10	[illegible]
75,[illegible]	1	[illegible]	[illegible]	1	[illegible]
1[illegible],000			[illegible]	[illegible]	[illegible]
12,[illegible]			Do. [illegible] Pref.	[illegible]	[illegible]
1,25[illegible]	1	[illegible]	Dorman, Long & Co., Ltd.	1	[illegible]
£400,000	[illegible]	4	Do. [illegible] Deb. Stk.	10[illegible]	[illegible]
40,000	1	[illegible]	[illegible] Pref.	[illegible]	[illegible]
25,000		4½	[illegible] Mort. Deb.	[illegible]	[illegible]

Engineering, Iron and Steel Companies. *Conti*

Present Amount subscribed	Shares	Last Dividend	Name	Paid up	Closing Prices
2[illegible]0,000	[illegible]	nil	Dunderland Iron Ore Co., Ltd., 6% Cum. Pref. and Participating	5	[illegible]
4,721	1[illegible]	1[illegible]	Ebbw Vale Steel, Iron & Coal Co., Ltd.	13	10½—11¼
69,754	15	10/-	Do. [illegible]	10	[illegible]—9[illegible]
20,250	10	8/-	Elliott's Metal, Ltd.	8	5—[illegible]
5,000	10	7%	Do. Cum. Pref. ..	10	8½—9
186,748	Stk	4	Do. Deb. 4	100	92—96
500,000	1	6d.	Fairbairn, Lawson, Combe Barbour	1	23/0—23/6
[illegible]	1	5	Do. 5% Cum. Pref. ..	1	20/0—21/0
300,000	100	4%	Do. Mortgage Deb.	100	100—102
27,000	10	6	Fairfield Shipbuilding & Engng. Co., Ltd., 6% Cum. Pref...	10	11½—1[illegible]
£250,000	Stk	4½%	Do. 4½% 1st Mort. Deb. Stk. Red.	100	100—102
£[illegible]000	Stk	5%	Do. 5% 2nd Mort. Deb. Stk. Red.	100	95½—100
126,000	3	2/4½	Fraser & Chalmers, Ltd., Ord. ..	3	3½—4
21,000	3	4/6	Do. 7½ Cum. Pref.	3	5¾—6¼
10,000	10	[illegible]	Galloways, Ltd. [illegible] Cum. Pref. 18001/28000	10	7[illegible]—7[illegible]
£150,000	Stk	4%	Do. 4% 1st Mort. Deb. Red..	100	85—87
100,000	1	[illegible]	Glover (W. T.) & Co., 5% Cum. Pref.	1	14/0—15/0
£100,000	Stk	4%	Do. 4% 1st Mort. Deb.	100	85—90
180,250	10	12	Greenwood & Batley, Ltd., Ord.	10	6[illegible]—6[illegible]
110,660	10	7%	Do. 7% Cum. Pref.	10	10[illegible]—11[illegible]
[illegible]0,000	100	[illegible]	Do. [illegible] Deb.	100	102—103
9[illegible]5,000	1	1	Guest, Keen & Nettlefolds, Ltd. Ord.	1	2[illegible]—2[illegible]
341,000	[illegible]	2/6	Do. 5% Cum. Pref.	5	6⅛—6⅜
£1,850,500	Stk	4	Do. [illegible] First Mort. Deb. Stk	100	106—108
13,000	[illegible]	2/6	Gwynnes, Ltd., 5% Cum. Pref. ..	5	2[illegible]—3[illegible]
250,000	1	1/-	Hadfield's Steel F'dry Co., Ld., Ord.	1	3[illegible]—4[illegible]
20,000	10	4/6	Do. 4½ Cum. Pref. ..	10	10½—11
30,000	5	3	Hall (J. & E.), Ltd. 6% Cum. Pref...	5	4[illegible]—5¼
28,001	5	7/-	Head, Wrightson & Co., Ltd	5	5½—6
£100,[illegible]	Stk	[illegible]	H[illegible] Ltd. [illegible] 6% Cum. Pref.	100	10[illegible]—10[illegible]
45,000	100	4½	Holdswell [illegible] Ltd. 4½% Deb.	100	85—87
110,000	10	10	[illegible] Ltd.	10	17[illegible]—18
60,000	10	7%	Do. [illegible] Cum. Pref.	10	14[illegible]—15½
37,500	10	20	Kynoch, Ltd	10	17—18
49,537	10	5%	Do. Cum. Pref.	10	10[illegible]—11
1[illegible],000	10	5%	Lanarkshire Steel, Ltd., [illegible] Cum. Pref. Reg. Nos. 1-[illegible],000	10	[illegible]
[illegible]0,000	10	17/-	Do. [illegible] Cum. Pref. [illegible] Red. Nos. [illegible],001-[illegible],000	10	[illegible]
150,000	[illegible]	8/6	Leeds Forge [illegible] Ltd.	[illegible]	[illegible]
120,000	[illegible]	7	Do. [illegible] Pref.	3	1½—[illegible]
150,000	[illegible]	5	Do. [illegible] 1st Mortgage Deb.	[illegible]	51½—52¼
[illegible]	[illegible]	[illegible]	[illegible] Ltd. Nos. [illegible]	9	8½—9
200,000	1	7½d.	[illegible] Cum. Pf	1	1[illegible]—1[illegible]
£3[illegible],000	Stk	4½	Do. 4½ 1st Mt. Deb. Stk. Red.	100	10[illegible]—11[illegible]
15,000	10	[illegible]	MacLellan (P. & W.), Ltd., Ord. Nos. [illegible]-[illegible],000	10	7[illegible]—[illegible]
[illegible]	10	[illegible]	Do. [illegible]	10	10—10[illegible]
£1[illegible]	Stk.	4½	Do. [illegible] Red. [illegible]	100	[illegible]—10[illegible]
40,000	10	[illegible]	[illegible]	[illegible]	1[illegible]—1[illegible]
[illegible]	1		Me[illegible]	1	[illegible]
[illegible]	1	[illegible]	Do. [illegible]	1	1[illegible]
£[illegible]	[illegible]	4½	Do. [illegible] Red.	100	99—102
[illegible]	1		M[illegible] Pref. ..	1	17/-—17/6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1	[illegible]	[illegible] Pref.	1	[illegible]
[illegible]	1	[illegible]	[illegible]	1	[illegible]
[illegible]	1	[illegible]	[illegible] Pref.	[illegible]	[illegible]
£[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			[illegible] Db. Stk., Red.	100	[illegible]
			[illegible] Ltd. A..	[illegible]	[illegible]
[illegible]			[illegible] B	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Pref.	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Engineering, Iron and Steel Companies.—Contd.

Present Amount Subscribed	Shares	Last Dividend	Name	Paid up	Closing Prices
70,000	10	10/	Pease & Partners, Ltd., Ord.	10	13½–13¾
300,000	10		Do. Deferred	10	9⅝–9⅞
£400,000	Stk	4	Do. 4% Perp. Deb. Stock	100	100–103
1[illegible],000	5	3/-	Peebles Bruce & Co., Ld., 6% Cm. P	5	4⅞–5⅛
65,000	1	—	Pooley (Henry) & Son, Ltd., Ord	1	11/0–12/0
13,000	5	—	Do. 5½% Cum Pref.	5	4[illegible]–5[illegible]
126,938	5	2/-	Rhymney Iron Co., Ltd.	5	2[illegible]–2[illegible]
73,062	5	2/-	Do. New	5	1[illegible]–2
£330,000	—	5	Do. 5% Mort. Deb., Red.	100	10[illegible]–102
350,000	1	1/2	Richardsons, Westgarth & Co., Ltd., Ord. 350,001—700,000	1	[illegible]–1
£350,000	1	7½	Do. 6% Cum. Pref.	1	1–1⅛
£350,000	Stk	4½%	Do. 4½% Perp. Deb. Stock	100	100–102
27,500	10	5/-	Rivet, Bolt & Nut, Ld., 5% Cum. Pref., No. 1 27 500	10	9[illegible]–10[illegible]
200,000	10	[illegible]	Russell John & Co., Ltd. Cum. Pref. 5%	10	9–10
100,000	Stk	4½%	Do. Deb 4½%	100	99–101
35,000	10	12/	Ruston, Proctor & Co., Ltd.	10	11–11½
£250,000	100	4%	Do. Mort. Debs. 4½% till 1906 then 4	100	96–98
275,000	1	[illegible]	Scott (Walter) Ltd., Ord.	1	[illegible]
300,000	1	7½d.	Do. 6% Cum. Pref.	1	1–1[illegible]
£300,000	Stk	4%	Do. 4% Perp. Deb. Stk.	100	92–95
[illegible]49,70[illegible]		[illegible]	Sheepbridge Coal and Iron Ord. 250,001/799700	1	30/0–30/6
112,275	1	1	Do. Guar. Pref. (5% Min.)	1	31/6–32/6
137,725	1	[illegible]	Do. Do. 112,276/250,000	8-	12/6–13/6
£111,300	100	5%	Shelton Iron, Steel and Coal Co., Ltd. 1st Charge 5% Debs., Red	100	95–98
£94,400	100	6%	Do. 6% 2nd Mort. Debs., Red.	100	96–100
250,000	1	8%	Smith's Dock Co., Ltd. Ord.	1	28/9–29/3
20,000	10	5%	Do. 5% Pref.	10	10¼–10[illegible]
200,000	100	4%	Do. 4% Deb. Stk.	100	99–101
100,000	1	1/	Smith's, Thomas, Stamping Wks. L.	1	2/6–3/0
50,000	Stk	5%	Do. Deb. 5%	100	
250,000	1	1/-	South Durham Steel & Iron, Ltd. Or.	1	1[illegible]–1⅜
300,000	1	1/2½	Do. 6% Cum. Pref.	1	1[illegible]–1[illegible]
£300,000	Stk	4½	Do. 4½% Per. Deb. Stock	100	92–94
30,000	10	5½%	Spencer, John and Sons, Ltd.	10	14½–14¾
250,000	100	2%	Do. 4% Mort. Deb.	100	92–94
6,000	100	£4	Staveley Coal and Iron "A"	60	154–156*
3,100	100	13/4	Do. "B"	10	25–26
6,100	60	£4	Do. "C"	60	151–15[illegible]*
1,100	10	13/4	Do. "D"	10	25–25½
49,560	10	5	Steel Co. of Scotland, Ld., Nos. 1 49,560	9	7½–8
116,240	Stk	5	Do. 5% 1st Mort. Deb. Stk. A Red.	100	109½–110
100,000	Stk	6	Do. 6% 2nd Mor. Deb. Stk. B Red.	100	103–106
85,000	10	9/-	Stewarts & Lloyds, Ltd., Ord.	10	19¼–19¾
55,000	10	6/-	Do. 6% Cum. Pref.	10	14½–15
350,000	Debs.	3½%	Do. 3½% Debs. Red. Nos. 1-3,500	100	94–95
634,732	1	6d.	Swan, Hunter & Wigham-Richardson, Lim. Ord.	1	[illegible]–1
538,845	1	6d.	Do. 5% Cum. Pref	1	1–1[illegible]
£240,000	Stk	4½%	Do. 4½% 1st Mort. Deb. Stk. Red	100	98–101
249,632	1		Talbot Continuous Steel Process Ord.	1	9/9–10/3
100,000	100	4%	Tannett Walker and Co. 4% 1st Mort. Deb.	100	65–70
300,000	1	6d.	Thames Iron Works, Shipbuilding & Engineering Co., Ltd., 5% Cum. Pf.	1	[illegible]
£200,000	100	4%	Do. 4% Irredeem. 1st Mort. Deb.	100	80–84
£148,000	1	3%	Thornycroft (John I.) & Co., Ltd. Or.	1	[illegible]
£198,000	1	6%	Do. do. 6% Cum. Pref.	1	[illegible]–1[illegible]
100,000	Stk	5%	Do. do. 5% Deb	100	103–106
880,000	1	4	Tredegar Iron and Coal "A"	14/	9/6–10/6
208,335	1	6	Do. "B"	1	15/6–16/6
27,000	1	0/4	Turnbull (Alex) & Co., Ltd. Ord. Nos. 20,001–47,000	1	5/0–6/0
20,000	1		Do. 5% Cum. Pref. Nos. 1-20,000	1	9/0–10/0
10,000	10	5/-	Tylor (J.) & Sons, Ltd. 5% Cum. Pf.	10	9–9½
$50[illegible]	$100	$[illegible]	United States Steel Corp. Com. Stk	$100	43½–43¾
$360314100	$100	$1¾	Do. 7% Cum. Pref. Stock	$100	110¾–111
$162268000	$1000	5%	Do. 10-60 yr. 5% Skg. Fd. G. Bds.	$1000	102–103
3,700,000	1	1/	Vickers, Sons & Maxim Ltd. Ord.	1	2[illegible]–2[illegible]
750,000	1	6d.	Do. 5% Non Cum. Pref.	1	1[illegible]–1[illegible]
£750,000	Stk	5%	Do. 5% Non Cum. Pref. Stock	100	122–125
£1,250,000	Stk	4%	Do. 4% 1st Mort. Deb. Stk. Red.	100	105–107
£950,000	100	4½%	Do. 4½% 2nd Mort. Debs., Red.	100	106–108
40,000	1	[illegible]	Walker, C. & W., Ltd.	1	2[illegible]–2[illegible]
10,000		5%	Do. Cum. Pref.	5	5¼–5¾
148,530	1	2½%	Wallsend, Slipway & Eng. Co., Ltd. Ord.	all	21/0–22/0
83,550	1	2½%	Do. 5% Cum. Pref.	all	19/3–19/9
225,000	1	1/2	Weardale Steel, Coal & Coke, Ltd., Def. Ord.	1	1–1[illegible]
500,000	1	7½d	Do. 6% Cum. Pref. Ord.	1	1[illegible]–1
£400,000	Stk	4	Do. 4% Perpetual Deb. Stock	100	93–96
66,666	5	3/-	Willans & Robinson Ord.	5	2¼–2¾

Electrical Manufacturing Companies.

Present Amount Subscribed	Shares	Last Dividend	Name	Paid up	Closing Prices
70,000	1	6d.	Alliance Elec. Co. Ltd. 5% Cum. Pf.	1	[illegible]
125,000	1	7½d.	Aron Elec. Meter Ltd., 6% Cum. Pf.	1	[illegible]
120,000	1	1/2	Bell's Asbestos Co., Ltd.	1	1[illegible]–1[illegible]
£10,000	5	7	British Aluminium Co. Ord.	5	4
£190,000	[illegible]		Do. Ord.	2	[illegible]–2[illegible]
£200,000	5	3/6	Do. 7% Cum Pref	5	5½–6
£286,000	Stk	[illegible]	Do. 5% 1st Mort. Deb. Stk. Rd.	100	98–102
£100,000	5	3	Do. "A" 6% Cum Pref.	5	[illegible]–5½
£100,000	5	[illegible]	Do. 4% Funding Certs	5	2[illegible]–3
100,000	5	4/-	British Insulated & Helsby Cables Ltd., Ord.	5	6[illegible]–7¼
100,000	5	3/	Do. 6% Cum Pref	5	5[illegible]–[illegible]
£500,000	Stk	4½%	Do. 4½% 1st Mort. Deb. Stk. Rd.	100	103–106
£212,000	Stk	4½%	British Thomson-Houston Co., Ltd., 4½% 1st Mort. Deb. Stk. Red.	100	98–100
500,000	5	3/-	British Westinghouse Electric and Manufac. Co., Ltd., 6% Pref.	5	1[illegible]–[illegible]
£1,016,353	Stk	4%	Do. 4% Mort. Deb. Stk. Red.	100	77–82
105,731	2	2/-	Brush Elec. Enging. Co., Ltd., Ord.	2	[illegible]
150,000	2	6	Do. 6% Pref.	2	1½–2
£125,000	Stk	4½%	Do. 4½% Perp. 1st Deb Stk.	100	97–99
£125,000	Stk	4½%	Do. 4½% Perp. 2nd Deb. Stk.	100	82–84
35,000	5	5/	Callender's Cable & Constn. Ltd. Ord.	5	11–12
40,000	5	2/6	Do. 5% Cum. Pref.	5	5[illegible]–6
£[illegible]00,000	Stk	4[illegible]%	Do. 4½% 1st Mort. Deb Stk. Red.	100	108½–110
85,000	3	1/6	Crompton & Co., Ltd.	3	2–2¼
£100,000	—	5%	Do. 5% 1st Mort. Reg. Debs.	100	95–98
52,000	5	10/-	Dick, Kerr & Co., Ltd., Ord.	5	8⅝–9[illegible]
61,000	5	3/-	Do. 6% Cum. Pref.	5	6–6[illegible]
£300,000	Stk	4½%	Do. 4½% Deb. Stock, Red.	100	104–106
233,334	1	6d.	Doulton & Co., Ltd., 5% Cum. Pref.	1	1⅛–1[illegible]
£233,334	Stk	4%	Do. 1st Mort. 4% Irree. Deb. Stk.	100	106–109
39,261	5	1/6	Edison and Swan United Electric Light, Ltd., "A" Shares Nos. 1-39,261	3	1[illegible]–1[illegible]
17,139	5	2/6	Do. "A" Shares Nos. 01-017,139	5	2½–3
£327,356	Stk	4%	Do. 4% Deb. Stock Red.	100	86–88
£72,720	Stk	5%	Do. 5% Second Deb. Stk. Red.	100	92–97
112,100	2	1/7½	Electric Construction Co., Ltd.	2	[illegible]
31,390	2	2/9	Do. 7% Cumulative Pref.	2	2–2¼
£200,000	Stk	4%	Do. 4% Perp. 1st Mt. Deb. Stk.	100	89–9[illegible]
£50,000	Stk	4½%	Do. 4½% Perp. 2nd Mt. Deb. Stk.	100	—
10,248	10	7/6	Evered and Co., Ltd.	10	9–11
25,000	10	5/-	Gen. Elect. Co. Ltd., 5% Cum. Pref.	10	9[illegible]–9[illegible]
£200,000	Stk	4%	Do. 4% 1st. Mt. Deb. Stk., Red.	100	95–99
40,000	5	5/-	Henley's (W. T.) Telegraph Works Co., Ltd., Ord.	5	13–14
40,000	5	2/3	Do. 4½% Cum Pref.	5	5¼–5½*
150,000	Stk.	4½%	Do. 4½% Mort. Deb. Stk. Red.	100	
50,000	10	15/	India Rubber, Gutta Percha & Telegraph Works Co., Ltd.,	10	18–19
£300,000	100	4%	Do. 1st Mort. Deb. Red.	100	99–102
100,000	1	3%	Scott (Ernest) & Mountain, Ld., Ord.	1	17/[illegible]–18/0
37,350	12	12/	Telegraph Construction and Maintenance Co., Ltd.	12	31–36
150,000	100	4%	Do. 4% Deb. Bonds	106	100–102
150,000	1	1/7½	United Electric Car Ord.	1	24/0–24/[illegible]
£50,000	Stk.	5%	Do. 5% 1st Mort. Deb. Red.	100	104–10[illegible]
160,000	1	6%	Do. 6% Cum Pref.	1	22/3–22/9

Locomotive Builders.

Present Amount Subscribed	Shares	Last Dividend	Name	Paid up	Closing Prices
200,000	1	1/-	Beyer, Peacock and Co., Ltd., Ord.	1	[illegible]
300,000	1	6d.	Do. 5% Cum Pref.	1	¾
£300,000	Stk	4½%	Do. 4½% Red. Deb. Stock	100	88–90
47,500	10	7½	Hawthorn, Leslie & Co., Ltd. Ord	10	98–100
60,000	100	5%	Manning, Wardle & Co., Ltd. 5% 1st Mortgage Deb	100	100–101
200,000	10	10/-	North British Locomotive Ord	10	17¾–18¼
75,000	10	5/-	Do. 5% Cum Pref.	10	12½–12[illegible]
25,000	10	—	Stephenson (Robert) & Co., Ltd., Or.	10	2[illegible]–2[illegible]
25,000	10	5/6	Do. 5½% Cum. Pref.	10	5¼–5½
£250,000	Stk	4%	Do. 4% Perp. Deb. Stock	100	83–85
180,000	1	2/-	Vulcan Foundry	1	26/0–26/6
£54,000	1	5%	Do. 5% Pref.	1	

Stocks and Shares marked * are quoted ex-dividend.

Share List—Continued.

Railway Carriage and Wagon Companies.

Present Amount Subscribed	Shares	Last Dividend	Name	Paid up	Closing Prices
10,000	10	7 6	Birm. Rail.-Car.&Wagon,L..1-10,000	10	24½—26
8,739	10	3/-	Do. Second Issue 1-8,739 ...	4	[illegible]
10,000	10	6/-	Do. Cum. Pref. [illegible] 1-10,000	10	13 —14½
197,224	Stk	4	Do. Deb. 4 [illegible]	100	[illegible]
50,000	10	10	Bristol and South Wales Railway Waggon, Nos. 1-50,000	3	5¾ — 6
8,000	20	-	Bristol Wagon & Carriage Works Nos. 1—8,000	10	18½—18[illegible]
5,000	10	-	Do. 1875, Nos. 8,001-13,000	[illegible]	3 — 3½
2,000	20	-	Do. 5 p.c. Participating Pref Nos. [illegible]	10	18½—18[illegible]
30,111	7	7/-	Gloucester Rail.-Car & Wagon, Ld., A, 1-29,861 & 49,751-50,000	7	10¾—10[illegible]
44,889	7	3 6	Do. B, 29,862-49,750, 50,001-75,000	7	4¼—4[illegible]
10,000	10	6	Lancashire and Yorkshire Wagon..	10	12½—13
14,567	10	15[illegible]	Lancashire Wagon, Ord.	2	2½—[illegible]
4,150	10	5[illegible]	Do. do. Pref.	10	[illegible]—10½
781,808	1	9d.	Metropolitan Amalgamated Rail.-Carriage & Wagon, Ld., 1-781,808	1	44 0—45 0
164,288	1	6d.	Do. Cum. A Pref. 5 [illegible] 1-164,288	1	[illegible]
235,000	1	7½d.	Do. Cum. B Pref. [illegible] 1-235,000	1	27 6—28 [illegible]
200,000	20	20/-	Midland Rail. Car & Wagon, Ld., 1-20,000	10	21—22
10,000	6	10	Western Wagon and Property Nos. 1-10,000	6	12—12[illegible]
40,000	6	10	Do. Nos. 10,001-[illegible]	2	4[illegible]—4½

The London Stock Exchange Committee has appointed special settling days as under:—

Thursday, March 8th.—W. T. Henley's Telegraph Works Company, Ltd., £41,978 4½ per cent. first mortgage debenture stock. Friday, March 9th.—W. T. Henley's Telegraph Works Company, Ltd., scrip (fully and partly paid) for £108,022 4½ per cent. first mortgage debenture stock, and has in addition ordered both these securities to be quoted in the official list.

JAMES A. MILNE.

Obituary Notices.

Mr. [illegible] Hersey, Swarthbeck, Ullswater, who died on Saturday, and for nearly half a century was a [illegible] in shipbuilding on the Mersey. Mr. [illegible] had been associated with Penrith [illegible] and he had reached the age of [illegible]. A man of remarkable scientific attainments, [illegible] designer of ships, and [illegible] for some of the largest and best vessels built on the Mersey [illegible].

James Rankin, Greenock, who died at his residence [illegible] Street, at the age of seventy-four, was for twenty-five years chief engineer in the Allan Line. His nephews, Messrs. John and William Rankin, are partners in the firm of Messrs. Rankin and Blackmore, [illegible] lucrative [illegible] abroad.

John [illegible], for twenty-six years manager for Wm. Cook and Sons (Sheffield), Ltd., steel, saw, and file manufacturers, Sheffield, died on the [illegible] inst., having attained his sixty-sixth year.

[illegible]

[illegible]

The Navy Appropriation.

The Navy Appropriation account for 1904-5, with the report thereon by the Comptroller and Auditor-General, shows an unexpended surplus of £[illegible] on the year. Sums realised by sales of old ships amounted to [illegible]. The report draws attention to extras amounting to £646,873 expended on three battleships of the *Dominion* class and five cruisers of the *Devonshire* class, which were the consequences of changes of Admiralty policy after contracts for these ships had been made. The total loss on naval stores and coal [illegible] the year amounted to over £43,000.

Allis-Chalmer's Bullock, Ltd.

Mr. James A. Milne [illegible] Milwaukee, [illegible] Allis-Chalmers-Bullock, Ltd. [illegible] the Allis-Chalmers-Bullock, Ltd. [illegible] Montreal [illegible] the Canadian Company [illegible] Allis-Chalmers [illegible]

Mr. Milne [illegible] of the Allis-Chalmers [illegible] Mr. [illegible], heretofore [illegible]

Prices Current of Coal, Iron, Steel, and Other Metals.

Manufacturers' and Merchants' Quotations.

News of the Week in Brief.

Wednesday, February 28th, 1906.

IN the **Iron Market** the event of the week has been the sudden jump in warrants, which has naturally been followed by makers. The artificiality of the whole business is its most impressive feature. There has been absolutely no justification for the exceptionally high price to which warrants have ascended except a speculative notion that some of the stock would be taken for the United States. This, however, has not happened, and now it looks as though the high-water mark had been reached in that country. Makers' iron has been maintained by warrants, and not by the influence of supply and demand. As to America, the reports for the last week or so have been more ominous than for a long time. There is talk of heavy contracts on hand, but facilities for overtaking them are so great that too much importance must not be attached to that condition.

No improvement can be reported in the [illegible] iron trade. The bears have still possession of the market, and they have not got to the lowest point yet. Warrants are down at [illegible] net cash sellers, buyers [illegible], but a lower price has been touched during the week. Buyers who are known to have large parcels of iron [illegible] place are afraid to do business, and many sales are thus being checked, waiting on events. Makers still quote 7[illegible]s. net f.o.b. for mixed Bessemer numbers. They are well off for orders, and are assured better prices will soon prevail. Stocks show a slight increase. Steel makers are doing a quiet business in rails, but [illegible] shipbuilding and engineering classes of steel.

Copper is uncertain, but as the statistical position shows the lowest visible supply on record, the quotation is likely to [illegible]. The market is [illegible] [illegible] felt by those who have sold [illegible]. The latest quotation is £70 cash.

The **Tin Market** [illegible]

Lead [illegible]

Spelter [illegible] . 6d.

Iron, Steel, Pig-Iron, etc.

SCOTLAND.

Messrs. David Colville and Sons, Ltd., Dalzell Steel and Iron Works, Motherwell, N.B., quote as follows. Prices delivered [illegible]

Steel		£ s. d.
DALZELL STEEL	Siemens Steel Plates, Marine Boiler Quality	[illegible]
	[illegible]	[illegible]
	Steel Bars, Boiler Quality	8 10 0
DALZELL STEEL	Siemens Steel Plates, Ship Quality Plates	[illegible]
	Bars	[illegible]
	Angles	[illegible]

Manufactured Iron.	£ s. d.
Bars, Dalzell	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Best [illegible]	[illegible]
Best [illegible]	[illegible]
[illegible]	[illegible]

[illegible] delivery in England and [illegible] without notice.

Malleable Common Bars	£ s. d.	
Dalzell [illegible]	[illegible]	per ton
[illegible]	6 10 0	
North British	6 10 0	
Dumpellier	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
Monkland	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	

[illegible]

John Spencer (Coatbridge), Ltd., Phœnix Ironworks, Coatbridge, N.B. [illegible]

	£ s. d.
Bars [illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Angles [illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Boiler Tube Strips [illegible]	[illegible]

[illegible]

Messrs. R. Feldtmann and Co., of Glasgow, [illegible]

Pig Iron:	No. 1	No. 3
	£ s. d.	£ s. d.
[illegible] Glasgow	[illegible]	[illegible]
Gartsherrie ...	[illegible]	[illegible]
Summerlee	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Langloan	3 [illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	3 [illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	3 [illegible]	[illegible]
[illegible]	[illegible]	[illegible]

NORTH OF ENGLAND.

Messrs. W. Whitwell and Co., Ltd., Thornaby Ironworks, Stockton, quote as follows at works:—

W. W. Bars	[illegible]
W. W. Best Bars	[illegible]
W. W. Best Best	[illegible]
W. W. Best Best Best	[illegible]
W. W. Best [illegible]	[illegible]
[illegible]	[illegible]
[illegible] Best	[illegible]
[illegible] Best Best	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible] Strip Iron	[illegible]
W. W. Angle Iron ...	[illegible]
W. W. Best Angle Iron	[illegible]
[illegible]	[illegible]

[illegible] less 2½ per cent. [illegible] 10th of month [illegible] delivery.

LANCASHIRE.

The Pearson and Knowles Coal and Iron Company, Ltd., Dallam and Bewsey Forges, Warrington, quote follows:—

		Iron.	Steel.
		£ s. d.	£ s. d.
	Bars	7 1[illegible]	[illegible]
	Angles	[illegible]	[illegible]
(BF)	Tees	[illegible] 15 [illegible]	[illegible]
	Hoops	[illegible]	[illegible]
W.I.W	Sheets	[illegible]	[illegible]

[illegible] F.A.S. Liverpool in [illegible] ton Lots.

Extras for Sizes and Cutting as per List.

Lots under [illegible] extra.

STAFFORDSHIRE.

Shelton Iron, Steel, and Coal Company, Ltd., Stoke on-Trent, North Staffordshire, and 122, Cannon Street London, quote:

	£ s. d.	
Crown Bars	7 10 [illegible]	per ton.
Best Bars ([illegible] rounds and squares)	[illegible]	[illegible]
Angles	[illegible]	[illegible]
Best	[illegible]	[illegible]
Tees	[illegible]	[illegible]
Best	[illegible]	[illegible]
Best [illegible] Iron	[illegible]	[illegible]
Rivet Iron	[illegible]	[illegible]
Best Rivet (Special)	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Best Turning	[illegible]	[illegible]
„ Plating..	[illegible]	„
Best Best	[illegible]	„
Treble Best	[illegible]	„
Plates	[illegible]	[illegible]
Best Plates	[illegible]	„
„ Boiler Plates	[illegible]	[illegible]
Best Boiler Plates	[illegible]	[illegible]
Treble Best Boiler Plates	[illegible]	[illegible]

Delivery f.o.b. Liverpool, Birkenhead or Manchester.

Tin Plates.

WALES.

Swansea Metal Exchange [illegible]

	£ s. d.
[illegible]	0 12 [illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible] Bessemer [illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Odd sizes, Bessemer primes	[illegible]
[illegible]	[illegible]
[illegible] plates [illegible]	14s. 3d. to 17 [illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]

[illegible]

[illegible] return of tin plates—

[illegible] boxes.

[illegible] boxes.

[illegible] boxes.

Messrs. Richard Thomas and Co., Ltd., of 33 and 35, Eastcheap, E.C. Works: South Wales, Burry, Lydney Lydbrook, and Cwmbwrla, quote:

	Per Box f.o.b. W[illegible]
Coke Tin-Plates:	£ s. d.
[illegible]	[illegible]
[illegible] Lydney	[illegible]
[illegible] Lydbrook	[illegible]
[illegible] Lydbrook	[illegible]
Charcoal Tin-Plates:	
[illegible]	[illegible]

WORCESTERSHIRE.

Baldwins, Ltd. (with which is amalgamated Knight and Crowther, Ltd.), Wilden Works, near Stourport, quote

	Singles [illegible]	Doubles [illegible] to 26 G [illegible]
	per ton.	per ton.
Black Sheets	£ s. d.	£ s. d.
[illegible]	1[illegible]	[illegible]
[illegible]	1[illegible]	[illegible]
[illegible]	12 [illegible]	[illegible]
[illegible]	13 [illegible]	[illegible]
[illegible]	1[illegible]	[illegible]
[illegible]	1[illegible]	[illegible]

[illegible]

Patent Coated Sheets	£ s. d.	£ s. d.
[illegible]	[illegible]	[illegible] 0
[illegible]	[illegible]	[illegible] 0
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

	Singles [illegible] per ton.	Doubles [illegible] per ton.
[illegible] Sheets	£ s. d.	£ s. d.
[illegible]	[illegible]	[illegible] 0
[illegible]	[illegible]	[illegible] 0
[illegible]	[illegible]	[illegible] 0

[illegible]

Galvanized Corrugated Sheets:	£ s. d.
"Phœnix" Brand [illegible] G., f.o.b. London, in Bundles	1[illegible] 7 6 per ton.
"Blackwall" Brand, [illegible] G., in felt lined cases for Australia, f.o.b. London	1[illegible] [illegible]

Galvanised Working Up-Sheets	£ s. d.
[illegible] G., f.o.b. London, in Bundles	[illegible] 7 [illegible] per ton.

WALES.

Cordes (Dos Works), Ltd., of Newport, Mon., quote "Star" brand [illegible] wrought nails, steel nails, &c.:

Discounts.

[illegible] strong rose and all fine rose, [illegible] body and body points.

[illegible] 4 inch to 7 inch strong rose, and [illegible] and body points [illegible] 2½ per cent. off all sharp pointed nails.

Delivered [illegible] lots of 1 cwt. and upwards. Extra [illegible] per cent. discount off [illegible] two tons and upwards.

Steel [illegible] points, [illegible] inch to 7 inch basis [illegible] per cwt. [illegible] and upwards [illegible] per cwt. } d/d any Railway Station.

Steel [illegible] nails, [illegible] inch to [illegible] inch basis [illegible] per cwt. [illegible] lots [illegible] per cwt. } d/d any Railway Station.

S[illegible] £8 per ton [illegible] works for 2 ton lots.

BELGIUM.

C. L. Faulkner, Suffolk House, Laurence Pountney Hill, London, E.C., quotes:—

P[illegible] in £ s. d. per ton of 1,016 kos. (2,240 lbs.) delivered free [illegible] ANTWERP for approved quantities.

Steel:		£ s. d.
[illegible]	at	[illegible] per ton.
Billets	at	[illegible]
Sheet Bars	at	[illegible]
Finished Steel:		
[illegible]	at	[illegible]
Angles	at	[illegible]
Tees	at	[illegible]
[illegible]	at	[illegible]
Fencing Standards	at	6 [illegible]
[illegible] Bars	at	[illegible]
Tyre Bars	at	[illegible]
[illegible]	at	6 [illegible]
Heavy Rails	at	[illegible]
Light Rails	at	[illegible]

Structural Steelwork. Prices on application.

GERMANY AND BELGIUM.

Messrs. Oscar Moenich and Co., Billiter House, Billiter Street, E.C., quote:

	£ s. d.
Belgian No. 2 Bar Iron	[illegible] per ton.
[illegible]	[illegible]
[illegible]	[illegible]
Angle Iron	5 17 0
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

All net, f.o.b. Antwerp.

[illegible]	[illegible]
[illegible]	[illegible]

[illegible] f.o.b. Antwerp.

[illegible]	[illegible] per keg.

CONTINENTAL.

Messrs. W. H. Perrott and Co., 101, Leadenhall Street, London, E.C., quote f.o.b. Antwerp [illegible]

	£ s. d.
[illegible]	[illegible] per ton.
[illegible]	[illegible]
[illegible]	[illegible]
Angles, „	6 0 0
Tees, „	6 [illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible] packed in Double Bags.

Metals.

Messrs. French and Smith, 147, Leadenhall Street, and 11, Oldhall Street, Liverpool, quote:—

TIN.

Tin	£ s. d.	£ s. d.
English Ingots, f.o.b., Dis. 1¼% & 1	[illegible]	[illegible] 0 per ton.
English Bars, f.o.b., Dis. 1¼ & 1	1[illegible]	[illegible]
Straits G.M.B., cash, Warehouse, Net	1[illegible]	[illegible]
Straits G.M.B., 3 months, Warehouse, Net	1[illegible] 10	[illegible]
Australian Mt. Bischoff, Warehouse, Net	[illegible]	[illegible]

COPPER.

Copper	£ s. d.	£ s. d.
Standard G.M.B., cash, Warehouse, Net	[illegible]	[illegible] per ton.
Standard G.M.B., 3 months, Warehouse, Net	[illegible]	[illegible]
English, Tough Cake & Ingot, Warehouse, Net	[illegible]	[illegible]
English, Best Select, Warehouse, Net	[illegible]	[illegible]
English, Sheets and Sheathing, f.o.b., Dis. 2½	[illegible]	[illegible]
English Sheets for India, f.o.b., Dis. 2½	[illegible]	[illegible]
Electro, Warehouse, Net	[illegible]	[illegible]
Ore, ex ship	[illegible]	[illegible] 0 per unit.
Regulus, Matte and Precipitate, ex ship	[illegible]	[illegible]

YELLOW METAL

Yellow Metal:	£ s. d.
Sheets, 4 by 4 feet, for India, f.o.b., Dis. [illegible]	[illegible] 7¼ per lb.
Sheathing „ „ „ „	0 0 7¾ „

SPELTER

	£ s. d.	£ s. d.
Silesian outports, Net	[illegible]	[illegible] 0 per ton.
Blende of [illegible] Net	[illegible]	[illegible] 7 [illegible]
Calamine, Net	[illegible]	7 10 [illegible]

LEAD.

	£ s. d.	£ s. d.
English Pig, Warehouse, Dis. 2½	[illegible]	1[illegible] 6 per ton.
Spanish, ex ship, Dis. 2½	[illegible]	1[illegible]
Lead Ore of 70% Net	[illegible]	[illegible]

ANTIMONY

	£ s. d.	£ s. d.
Star Regulus, f.o.b., Dis. [illegible]	[illegible]	[illegible] 0 per ton.
Ore, [illegible] ex ship, Dis. [illegible]	[illegible]	[illegible]
Crude, ex ship, Dis. [illegible]	[illegible]	[illegible]

QUICKSILVER

	£ s. d.
Spanish, [illegible] Warehouse, Net	[illegible] per flask.
Italian „ „ „	7 5 6

Coal.

LEICESTERSHIRE.

The Nailstone Colliery Company, Leicester, quote Prices per ton [illegible] Pit, of 20 Cwt. with [illegible] Cwt. [illegible] as follows:—

Upper Main Seam:	s. d.
Main Coal	[illegible]
Best Hard Seam [illegible]	[illegible]
Best Hard Steam Cobbles [illegible]	[illegible] 0
[illegible] Slack	[illegible]

[illegible]

DERBYSHIRE.

The Manners Colliery Company, Ltd., of Ilkeston, quote as follows, per ton at pit:

Kilburn Coal:	s. d.
Best London Brights	[illegible]
[illegible] Nuts [illegible]	[illegible]
Steam Nuts [illegible]	[illegible]
[illegible]	[illegible]
[illegible] Slack	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Rutland Coal [illegible]
[illegible]

The Clay Cross Company's Collieries, Clay Cross near Chesterfield, quote:
[illegible]

NOTTINGHAMSHIRE.

'The Digby Colliery Company, Ltd., near Nottingham, quote [illegible]:—

Digby Coal [illegible]
[illegible]

Gedling Colliery.
[illegible]

Chemicals.

Messrs. S. W. Royse and Co., Albert Square, Manchester. [illegible]

Acid [illegible]
Acetate of Lime [illegible]
Alumina: Alum, Lump, loose [illegible]
Ammonia [illegible]
Arsenic [illegible]
Bleaching Powder [illegible]
Borax [illegible]
Coal Tar Products: [illegible]
Crude 20% at 120° C. [illegible]
Solvent, 90% at 160° C. ...... f.o.b. [illegible]
[illegible]
Copper [illegible]
Cyanides [illegible]
Lead [illegible]
[illegible]

Naphtha Wood Miscible [illegible]
Solvent [illegible]
Potash [illegible]
Soda [illegible]
Sulphur: [illegible]
Zinc [illegible]
Shellac [illegible]

Minerals.

Messrs. S. W. Royse and Co. [illegible]

Barytes [illegible]
China Clay [illegible] ton, f.o.b. Cornwall; stocks also kept [illegible]
Chrome Ore [illegible]
Manganese [illegible]
Ochre [illegible]
Talc [illegible]

Messrs. Henry Bath and Son quote:—

Copper Ore [illegible]
Tin Ores [illegible]
Lead Ore, [illegible]
Blende, 50 [illegible]
Calamine [illegible]
Antimony [illegible]

Messrs. Barrington and Holt, Cartagena, quote:—

Iron Ore [illegible]
Manganese [illegible]
Lead Ore: [illegible]

Timber.

Messrs Alfred Dobell and Co, Liverpool [illegible]

COLONIAL WOODS.

Timber.

		£	s.	d.	£	s.	d.
Quebec Square White Pine	per cub. ft.	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]
Quebec Waney Board Pine		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
St. John Pine, 1st quality		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lower Ports Pine		[illegible]	1	[illegible]	0	1	[illegible]
Quebec Red Pine	"	[illegible]	1	[illegible]	0	[illegible]	[illegible]
Quebec Oak, 1st quality	"	0	[illegible]	[illegible]	0	[illegible]	[illegible]
Quebec Oak, 2nd quality		[illegible]	1	[illegible]	0	[illegible]	[illegible]
Ash		[illegible]	1	[illegible]	0	[illegible]	[illegible]
Elm		[illegible]	[illegible]	[illegible]	0	1	0
Hickory		[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]
Quebec Birch		[illegible]	1	6	0	[illegible]	[illegible]
St. John Birch		0	1	6	0	[illegible]	[illegible]
Birch Planks		[illegible]	[illegible]	10	0	1	[illegible]
Spruce Spars		[illegible]	[illegible]	[illegible]	0	1	0

Deals.

		£	s.	d.	£	s.	d.
[illegible] Quebec Pine	per std.	[illegible]	[illegible]	[illegible] to	[illegible]	10	[illegible]
[illegible] do		[illegible]	[illegible]	0	[illegible]	0	0
[illegible] do do		11	[illegible]	0	13	[illegible]	0
St. John Miramichi, etc., Spruce		[illegible]	1	0	8	0	0
Nova Scotia Spruce		[illegible]	[illegible]	6	7	17	6
Spruce Boards		[illegible]	[illegible]	[illegible]	7	0	0

UNITED STATES, ETC., WOODS.

Pitch Pine.

		£	s.	d.	£	s.	d.
Hewn	per cub. ft.	0	1	6 to	0	[illegible]	0
Sawn		0	1	[illegible]	0	1	10
Planks Stowage		0	1	0	[illegible]	1	[illegible]
Boards Prime	per std.	16	10	0	18	10	0
Oak Timber	per cub. ft.	0	1	6	0	[illegible]	6
Oak Planks		0	1	9	0	2	1
East India Teak	per load	[illegible]	0	0	[illegible]	0	0
Greenheart		[illegible]	15	0	7	5	0

EUROPEAN WOODS.

Timber.

		£	s.	d.	£	s.	d.
Riga Redwood	per cub. ft.	0	1	6 to	0	2	0
Dantzic and Memel Fir, Crown	"	0	[illegible]	1	0	[illegible]	6
Dantzic and Memel Fir, Middling	"	0	1	9	0	1	11
Stettin	"	0	1	9	0	1	11
Swedish	"	0	1	0	0	1	3
Riga Whitewood		[illegible]	1	0	0	1	3
Norway Mining Timber		0	0	9	0	1	0
Dantzic and Stettin, etc., Oak		0	2	6	0	[illegible]	0
Norway Spars		[illegible]	1	[illegible]	0	1	[illegible]

Deals.

		£	s.	d.	£	s.	d.
Red Archangel and Onega, 1st quality	per std.	19	0	0	20	0	0
Do. do 2nd quality	"	14	0	0	16	0	0
Do do 3rd quality	"	10	10	0	12	10	0
St. Petersburg, 1st quality	"	16	0	0	17	10	0
Do 2nd quality	"	14	0	0	15	0	0
Gefle	"	11	10	0	16	0	0
Wyburg	"	11	0	0	12	10	0
Uleaborg	"	10	0	0	[illegible]	10	0
Gothenburg	"	11	0	0	16	0	0

Tin Plate Mill Statistics.

In Wales there are about 450 tinplate mills, of which 95 per cent. were in operation at the close of November. In the United States there are about 340 regularly operative mills, which have been in work at one time or another within the past year, the leading interest having some 242 independent interests. There are about thirty other mills not in regular work. It can be assumed that an average of not less than 400 mills was operated in Wales during 1905, while an average of scarcely more than 275 mills was worked in the United States. With substantially the same total production, it would appear that the output per mill has been between a third and a half greater in the United States than in Wales.

Tinplates.

Thus far the tinplate market fails to show any signs of improvement, and has to some extent retrograded under the keen competition for all or any orders in this market. There has been a little more inquiry for Eastern and Western oil sizes, though that business lacks its accustomed vitality; 14 by 18¾ and 14 by 20½ are offering in vain at 19s., and [illegible] by 20 Siemens-Martin at 18s. 4½d., but these prices do not appear to produce business in the quiet state of the oil trade; IC 14 by 20 Bessemers can be had freely at 12s. 7½d., and some business has been secured at a slight discount on this figure. IC 20 by 28, 112 sheets, can be obtained at 25s. 6d., and IC 20 by 28, 56 sheets, at 12s. 10½d. to 13s. with a little more inquiry for these sizes. Siemens black plate of finished quality is to be had from £9 15s., with considerable competition for all orders of this character. Here are more inquiries for charcoal ternes, but charcoal tins have been rather neglected this week. Waster coke tin-plates have been in most inquiry for the Eastern markets, with some demand for the home trade.

The Outlook for Copper Prices.

The expectation of high prices being maintained for copper, at least over the spring, looks like being fully realised. The speculative market, it is true, was temporarily depressed through a lull in the legitimate demand, and by the disposal of copper reshipped from China which was not actually wanted there, and realised on this side on comparatively low terms, though at a considerable profit to the original buyers. There has been some aggressive selling in standard copper, the value of which for forward delivery dipped to about £74 in spite of the abnormally reduced warehouse stocks, which practically constitute now a record. Meantime, however, the concessions expected by bears from America have not materialised, except for a fractional reduction by the Copper Trust. Consumers seem inclined to step in to cover needs over the spring, and as stronger advices are received from America over-sold operators show some anxiety to repurchase, but find difficulty in doing so even at top prices. The advance of about £2 15s. above the lowest price touched this year has eventually spread to forward delivery, and the market has thus been restored to a more normal condition as compared with refined. The chief producers, being sold out a few months ahead, continue to show a firm front, and the reduced stocks in manufacturers' hands cannot but lead to fresh buying, seeing that the general position has remained healthy, with consumption and production running pretty closely together.

Belgian and German Iron.

Messrs. Oscar Moenich and Co.'s circular states that since some of the makers of Belgian and German iron and steel of various descriptions have brought down their prices to reasonable figures, some business has been put through for the Eastern markets. This shows that the demand, which was a fairly steady one until the excessive rise took place, had only been checked by this advance.

The Technical Library.

Bibliography No. 5.—Iron and Steel.

Andrews, T., Microscopic Internal Flaws in Steel Rails and Propellor Shafts. By T. Andrews. 8vo, sewed. 1s. Spon.

Andrews, T., Microscopic Internal Flaws, Inducing Fracture in Steel. By T. Andrews. 8vo, sewed. 2s. Spon.

Arnold, J. O. Steel Works Analysis. By J. O. Arnold, Professor of Metallurgy, University College, Sheffield. Second Edition. With 22 illustrations and diagrams. Crown 8vo. 10s. 6d. Whittaker.

Bale, G. R. Modern Ironfoundry Practice. Part I.: Foundry Equipment, Materials Used and Processes Followed. By Geo. R. Bale, Assoc.M.Inst.C.E. Crown 8vo, 400 pp. Price 5s. net. post free. Technical Publishing Company.

Brearley, H., and Ibbotson, F., B.Sc. The Analysis of Steel-Works Materials. 85 illustrations. 8vo. 14s. net. Longmans.

Brough, B. H. The Journal of the Iron and Steel Institute. Edited by Bennett H. Brough, Secretary. Published half-yearly. 8vo, cloth. 16s. Spon.

Colby, A. L. American Standard Specifications for Steel. Second edition, revised, 103 pp., Crown 8vo. 5s net. New York. Spon.

Davies, J. Galvanised Iron: its Manufacture and Uses. 8vo. 5s. net. Spon.

Ede. G. Management of Steel. Seventh edition, Crown 8vo. 5s. Spon.

Flanders, W. T. Galvanising and Tinning, with a special chapter on Tinning Grey Iron Castings. 8vo. 8s. 6d. net. Spon.

Greenwood, Prof. W. H., F.C.S., M.Inst.C.E. Steel and Iron. With about 100 diagrams. 5s. Cassell.

Harbord, F. W., and Hall, J. W. The Metallurgy of Steel. With 37 plates, 280 illustrations in the text, and nearly 100 Micro-Sections of Steel. Second edition revised. Large 8vo., handsome cloth. 25s. net. Griffin.

Hasluck, P. N. Smiths' Work. With [illegible] engravings and diagrams. Illustrated. Cloth [illegible] Cassell.

Hiorns, A. H. Iron and Steel Manufacture. [illegible] Macmillan.

Hiorns, A. H. Iron and Steel Manufacture. Illustrated. Globe 8vo. 3s. 6d. Macmillan.

Hoare, Chas. Iron and Steel. A Work for the Forge, Foundry, Factory, and Office. [illegible] leather. [illegible] Lockwood.

Horner, J. The Principles of Pattern Making. Written [illegible] for apprentices and [illegible] students in technical [illegible]. [illegible] engravings. Second edition. [illegible] 6d. Whittaker.

Horner, J. G. Practical Ironfounding. Over [illegible] engravings. Third edition. 4s. Whittaker.

Howe, H. M. The Metallurgy of Steel. Profusely illustrated. Royal 4to. 50s. Sampson Low.

Huntington, A. K., and McMillan, W. G. Metals: Their Properties and Treatment. 122 illustrations. Fcp. 8vo. 7s. 6d. Longmans.

Iron and Steel Maker, The. With 5 folding plates and [illegible] illustrations in the text. 5s. Ward, Lock.

Jeans, J. S. The Iron Trade. Books on Business Series. Illustrated. Crown 8vo. 2s. 6d. net. Methuen.

Kirk, E. Cupola Furnace. A Practical Treatise on the Construction and Management of Foundry Cupolas. Demy 8vo. New York. 14s. Spon.

Macfarlane, J. W. Practical Notes on Pipe Founding. 8vo. 12s. 6d. Spon.

Marks, E. C. R., A.M.Inst.C.E., M.I.M.E. The Manufacture of Iron and Steel Tubes. Second edition. Prices 5s. net, post free. Technical Publishing Co.

Pavloff, M. Atlas of Designs concerning Blast Furnace Practice. 127 plates, 14 in. by 10½ in. oblong, sewed. £1 1s. net. Spon.

Sharp, J. Modern Foundry Practice. Second edition. 222 illustrations. 8vo. 21s. net. Spon.

Spencer, A. Roll Turning for Sections in Steel and Iron. Second edition. 78 plates. 4to. £1 10s. Spon.

Stevenson, J. L. The Design and Equipment of Blast Furnaces. Demy 8vo. 10s. net. Spon.

Turner, Thos., Assoc.R.S.M., F.I.C. The Metallurgy of Iron. Second edition, revised. In Large 8vo, illustrated. [illegible] Griffin.

Turner, T., M.Sc., A.R.S.M., F.I.C. Lectures on Iron Founding. [illegible] With [illegible] illustrations. [illegible] Griffin.

Twelvetrees, W. N., M.I.M.E. Structural Iron and Steel. A Text Book for Architects, Engineers, Builders and [illegible] With [illegible] illustrations. [illegible] net. Whittaker.

Twelvetrees, W. N. Concrete-Steel. A Treatise [illegible] Construction. A Practical Handbook for Builders, Architects, Engineers [illegible] by W. N. Twelvetrees, M.I.M.E. With [illegible] Whittaker.

Wyllie, C. Treatise on Iron and Steel Founding. [illegible]

New Patents Applied For.

Feb. 12th.—Feb. 17th.

Engineering—Civil, Mechanical, etc.

BENDING MACHINES.—Heinrich Stern and Albrecht Rogge, London. Improvements in and relating to bending and straightening machines. 4,[illegible].

BOILERS.—Hermann Sandvoss, London. A new and useful signal for boilers. [illegible]

——A. F. Craig and Co., Ltd., and Richard Webster, Glasgow. Improvements in and relating to steam boilers. [illegible]

——Nicola Michelena y Inarra, London. Improvements in steam boilers. 3,370.

BRAKES.—John Brache le Maitre, Birmingham. Improvements in brakes for rotary members. 3,866.

——John Wills Cleland, London. Improvements relating to brakes for railway and like vehicles. 3,4[illegible].

——Harold [illegible] and William Leslie [illegible], London. Improvements relating to brakes for railway wagons and like vehicles. 3,53[illegible].

——Walter Victor Turner and Edward Austin Wright, London. Improvements in air brake apparatus. 3,[illegible].

——William Hadley Wood, London. Improvements in railway brakes. 3,423.

CHUCKS.—Theron Studenburg Carroll, United States. Improvements in drill chucks. 3,494.

COAL CONVEYING.—James Muir Scalley, London. Improved method of and apparatus for conveying coal in mining. [illegible]

COAL CUTTING.—Frederick Wilson Hurd, Glasgow. Improvements in coal cutting machinery. 3,364.

[illegible] CAGES.—William [illegible] and John Linsley, [illegible]. Improvements in devices for supporting colliery cages in case of accidents. 3,[illegible].

CONVEYERS.—Charles Percy Watson, London. Improvements in or connected with endless conveyers. 3,392.

COUPLING DEVICES.—Paul Gustave Quenard, London. Improvements in coupling devices for the adjacent end portion of shafts connected by differential gear. 3,58[illegible].

DISTRIBUTING VALVES.—William Eastwood, Halifax. Improvements in steam engine distributing valves and valve gear. 3,5[illegible].

——John Ignatius Shirley, Dublin. Improvements relating to distributing valve and valve gear. 3,[illegible]47.

DRIVING MECHANISM.—George Herbert Smith, Wolverhampton. Means of mounting a wheel with its axis inclined to that of an axle or shaft with which it turns, and of driving the wheel from the axle or shaft or the axle or shaft from the wheel. 3,30[illegible].

EXPLOSION ENGINES.—Louis Boudreaux and Louis Verdet, London. Improvements in or relating to explosion engines. 3,748.

FANS.—[illegible] Ilinoldovitsch, London. Improvements relating to ventilating fans. 3,[illegible].

FILES.—Edward Giesler Herbert and Charles Fletcher, Manchester. A machine for testing and indicating the [illegible] of files. 3,[illegible].

FORGING.—Frederick Arthur Murphy, Manchester. Improvements in machines for forging or stamping square, hexagon and like nuts. [illegible]

FRICTION CLUTCHES.—Percy Warren Noble, Coventry. Improvements in or relating to friction clutches. 3,394.

——Robert Hall Longbotham, London. Improvements in friction clutches. 3,75[illegible].

FUZES.—King's Norton Metal Company, Ltd., Thomas [illegible] Bayliss and Ernest Whitworth, London. Improvements in fuzes for Lyddite shells and other explosive projectiles. [illegible]

GEAR WHEELS.—Herbert Burr [illegible], London. Improvements in and relating to gear [illegible].

GIRDERS.—Ferdinand Joseph [illegible], London. An improved construction of girder. [illegible]

GRABS.—Dudley James Banard, London. Improvements in grabs. 3,4[illegible].

HOPPER WAGONS.—George [illegible], London. Improvements in or relating to the bottom doors of hopper and like wagons. 3,770.

INTERNAL COMBUSTION ENGINES.—[illegible] and Morris Columbus White, London. Improvements in or relating to the fuel and lubricant supply for internal combustion engines. 3,916.

——John Hutchings, London. Improvements in and relating to internal combustion engines. [illegible]

——Fried. Krupp Aktiengesellschaft Germaniawerft and Gebruder Korting Aktiengesellschaft, London. Improvements in internal combustion engines in which petroleum is the combustible. [illegible]

——Ernest [illegible], [illegible]. Means for diminishing the noise made by the gases when escaping from cylinders of internal combustion engines into the atmosphere. 3,918.

——Achille Sabarini and Oreste Bartolozzi, London. Improvements in and relating to internal combustion engines. 3,595.

——Percy [illegible], Halifax. Improved means for cooling the cylinders of internal combustion engines and for like purposes. 3,936.

JOURNAL BOXES.—Edgar [illegible], London. Improvements in and relating to axle journal boxes [illegible].

LATHES.—David William Francis [illegible], London. Improvements in turning and boring lathes. 3,[illegible]6.

LOCOMOTIVES.—George Hughes, Manchester. Improvements in locomotive and traction engines. [illegible]

LUBRICATORS.—George Charles [illegible], Newcastle-on-Tyne. Improvements in lubricators for [illegible] and the like for locomotives and other machines. 3,480.

——P. G. Hill, London. Lubricators for crank pins of motive power engines. 3,[illegible].

——Maurice George [illegible] and William Henry [illegible], London. Improvements in and relating to positive feed lubricators. 3,[illegible].

MECHANICAL STOKERS.—John Vicars, [illegible] Vicars and John Vicars, jun., Liverpool. Improvements in or connected with mechanical stokers. [illegible]

MINING CAGES.—Henry Houghton, Liverpool. Improvements in or connected with safety fences or gates for mining cages or the like. 3,[illegible].

PACKING.—Richard Schulz, Liverpool. Improvements in labyrinth packing for rotary machines. 3,780.

——Hugh Ramsay, Woodside, Glasgow. Improvements in packing for stuffing boxes and the like. [illegible]

PNEUMATIC POWER HAMMERS.—William [illegible], London. Improvements in and relating to pneumatic power hammers. 3,412.

POWER.—James William Cross, London. Improved method of and means or apparatus for preparing and applying as motive fluid a heated mixture of steam and a gaseous medium. 3,4[illegible].

PROJECTILES.—Edward Ohl, London. Improvements in projectiles. 3,685.

PUMPS.—John Gwynne and Edward Washbourn Sargent, London. Improvements in centrifugal pumps. 3,4[illegible].

RAILWAY RAILS.—Alfred James Gardner and Illius Augustus Timmis, London. Improvements in or relating to [illegible] devices for railway rails. 3,863.

Railway Sleepers.—Albert Collet, London. Improvements in and relating to cutting rail or chair seals in railway sleepers. 3,[illegible]1.

Relief Mechanism.—Robert Thornewill and Alfred D[illegible], Liverpool. Improvements in relief mechanism appli[illegible] to valves of the Corliss type. 3,868.

Rotary Engines.—Griffith Brewer, London. Improvements in rotary engines. 3,[illegible]

——John Slee, Liverpool. Improvements in rotary engines. 3,[illegible]

Safety Coupling.—Thomas Fisher Williams and William Lewis Jones, Swansea. An improved safety coupling for colliery, quarry, and other trams or tubs. 3,[illegible]

Safety Retaining Devices.—John [illegible], and Augustus Marsden, London. Improvements in and relating to safety retaining devices for mine skips, cages, lifts and the like. 3,[illegible]

Safety Valve.—David Gray Cameron, James [illegible] and Henry Claude Walker, London. A safety valve for boiler water gauges. 3,527.

Sheet Metal.—Alfred de Back, Essex. A new or improved [illegible] for flattening, cutting and shaping into strips [illegible] sheet metal articles or the like. 3,[illegible]

Sheeting Piles.—John Riddell, London. A new or improved method of connecting steel sheeting piles. 3,846.

Steam Engines.—Harold Frederick, Hants. Improvements [illegible] engines. 3,[illegible]

Steam Gauges.—Thomas Hesketh, Kent. Improvements in gauges for indicating the height of water in steam boilers and the like. 3,[illegible]

Steam Generators.—John Henry, London. Improvements in devices for cleaning the outside of pipes, tubes and any [illegible] part in steam generators, superheaters, water heaters [illegible] the like, where soot and dirt or the like may collect. [illegible]

——Charles Cunningham Black and David McCracken, Glasgow. Improvements in steam generators. [illegible]

——John Cowan and Arthur John Fuller, London. Improvements in and relating to the generation of steam. [illegible]

Spark Arresters.—Frank Matthew Allen, London. A new or improved device for arresting sparks from the funnels of locomotives and the like. 3,670.

——Charles Cooper, London. Improvements in spark arresting and extinguishing apparatus for steam locomotive funnels. 3,391.

——Tom Hardy, Leeds. Improvements in or connected with spark arrestors. 3,952.

——Thomas Farrer Troughton, Manchester. Improvements in means for preventing the issue of sparks, live cinders and the like, from the chimneys of railway and other locomotives. 3,484.

Spring Washers.—Bayliss, Jones and Bayliss, Ltd., and Robert Howarth, Wolverhampton. Improvements in the manufacture of spring washers for use in locking screw [illegible] 3,[illegible]

Tapping Machines.—Hugo Bilgram, London. Improvements in tapping machines. 3,[illegible]4.

Tar Extraction.—Samuel Bannister Clapham and Thomas Alborn Clapham, Yorks. Improvements in apparatus for extracting tarry and like matter or substances from gases. [illegible]

Tool Holder.—Paul Tzschabran, Berlin. Tool holder for turning and planing steels. 3,668.

[illegible]—Robert [illegible], Coventry. A new and improved [illegible] of operating turbines and the like by internal combustion. 3,482.

——Godfrey [illegible], London. Elastic fluid turbine. [illegible]

[illegible] Blades.—James Wilson, London. Improvements in [illegible] connected with the [illegible] of steam turbine blades. [illegible]

[illegible] Otto [illegible] and Morris [illegible], London. Improvements in or relating to [illegible] of [illegible]

[illegible] Edward Mather, jun., Glasgow. Improvements [illegible] purposes. [illegible]

Water Softeners.—Frederick Henry Curtis, Gu[illegible] water softeners. [illegible]

Shipbuilding, etc.

[illegible]

[illegible]

[illegible] Parkes, John Kiley Mehan, and Thomas Fauset Macdonald, [illegible]

[illegible] to suction dredgers. 3,4[illegible]

Life Boats.—Juliane Krauss, *nee* Fuhrmann, Paris. Improvements in life boats. 3,535.

[illegible]

Propellers.—[illegible] New or improved screw propeller. [illegible]

Ships' Plates.—John Elder, Edinburgh. Improved method [illegible] plates, frames and the like.

Submarine [illegible] Improvements in fin-controlled submarine and submerge[illegible]

[illegible]

[illegible] Engines.—Philip Owen Penrose and Henry John [illegible]

Iron and Steel—Metallurgical, etc.

[illegible] Improvements [illegible] blast.

[illegible] Improvements relating to the withdrawal [illegible]

[illegible] 3,[illegible]7.

[illegible] London. An improved process for the extraction of gold, platinum, [illegible]

[illegible] London. Process of [illegible]

[illegible] London. Im[illegible]

[illegible] Improvements [illegible] 3,779.

[illegible] London. Improved [illegible]

[illegible] Improvements in the treatment of tin [illegible]

[illegible] London. Improvements [illegible] 4,008.

New Catalogues.

The British Thomson-Houston Company, Ltd.—Pamphlet No. 191 describes and illustrates various [illegible] of automatic circuit breakers. It supersedes pamphlet No. 162.

Allis-Chalmers Company.—Bulletin No. [illegible] of the Power Department gives an interesting test of the New York subway engines described some time ago in Page's Weekly.

Mather and Platt, Ltd., Manchester.—As mentioned elsewhere, the firm are manufacturing the Zoelly Patent Turbine. A new illustrated pamphlet has been issued embracing turbines of from 75 to 5,000 b.h.p.

The District Electric Company, Wolverhampton, forward an illustrated eight-page pamphlet, with some remarks on the selection of an electric fan, and a circular dealing with their flexible-arm electric desk lamp.

C. W. Hunt Company, New York.—Pamphlet No. 061, is concerned with the general line of machinery manufactured by the firm, including parabolic boom towers steam shovels, elevators conveyors, industrial railways etc.

Samuel Denison and Son, Ltd., Leeds.—A 1906 list of weighing machines and weighbridges has been issued. It is fully illustrated and deals with a wide range of apparatus, from small scales to weighers for armour plates, heavy castings, etc. This list cancels all previous ones.

Thomas Piggott and Co., Ltd., Birmingham.—A four-page circular, admirably arranged, presents the leading characteristics of the firm's patent pressed steel tanks ranging from [illegible] to 38,400 gallons capacity. These tanks are standard, only three kinds of plates being used, so that in the event of stock tanks being of unsuitable size, any multiple of 4 ft. in length or width can be made at short notice.

Lancaster and Tonge, Limited, Manchester.—The firm, in their new catalogue of the Lancaster Steam Traps and Steam Dryers, afford much additional information regarding both these specialities, together with a list of some of the principal users. Rarely is so much care expended upon the effective production of explanatory diagrams, several in the present instance being rendered in black, green and gold.

The Leeds Forge Company have issued a series of illustrated sheets with the undermentioned samples of their products: 35 tons high-sided wagon with Fox's pressed steel underframe and bogies for the Natal Government Railway; Fox's pressed steel standard carriage bogie with coil bolster springs; 40-ton all steel bogie platform wagon (4 ft. 8½ in. gauge); Fox's pressed steel motor bogie truck for the Metropolitan Railway; standard wagon (open ended) wheel base 8 ft. [illegible] in. (4 ft. [illegible] in. gauge), and [illegible]-ton bogie wagon for transporting steam ploughing engines (4 ft. 8½ in. gauge).

Consett Iron Company, Limited.—A new booklet has been issued forming a handy compendium of the firm's output. It is provided with a list of [illegible] addresses and a sketch map of the [illegible] Derwenthaugh [illegible]. It includes [illegible] the [illegible] steel plates and [illegible] plates [illegible] also table of [illegible] weight and [illegible] per foot for steel plates [illegible] [illegible] pamphlet [illegible] steel chequered [illegible]

A. and P. Steven, Strand, W.C.—A freely illustrated catalogue, printed on art paper, describes the various forms of goods and passenger lifts constructed by the firm, also their pumping [illegible] hydraulic baling presses, cranes, etc.

Calendars.

Johnson and Phillips, Ltd., Old Charlton, Kent, have issued a neat calendar in green and gold, with illustrations of tramway cable laying, etc., the dates being rendered in red and black. Another useful item from the same firm is a substantial card for the insertion of telephone numbers.

Books Received.

"Modern Turbine Practice and Water-Power Plants." By John Wolf Thurso. Archibald Constable & Co., Ltd. 10s. net.

"The Engineers' Pocket Dictionary." French—English. M. Lvoff, Percival Marshall & Co. 1s. 6d. net.

"Proceedings of the Fifteenth Convention of the Canadian Electrical Association, held in the City of Montreal." June, 1905. Toronto: The Canadian Electrical News Press.

"Patents to Inventors, with a chapter on Patent Agents." By Arthur Hugh Stanley. Percival Marshall & Co. 3d.

Changes of Address, etc.

Announcements of changes in firms and their addresses notices of new works or extensions, are invited for inclusion in this column.

The Wilkins Wire Rope Company, Ltd., of Wapping, have removed the whole of their manufacturing business to Eastwood, Notts.

Mr. H. Nestor Schnurmann is proceeding to South America as technical adviser to Messrs. Fraser and Chalmers, with headquarters at Buenos Ayres.

Messrs. Callender, of Erith. In reference to the report that the firm intend to remove their cable works to Germany, Mr. Callender stated on Thursday that there was some foundation for the rumours, but no decision had been arrived at. The firm had had to stop the night men and discharge some of the day men, their Continental trade having entirely ceased owing to the prohibitive tariffs of protected countries, and for that reason they had considered the subject of opening works in Germany. Reports had been made as to possible sites and plans prepared. If the firm went to Germany they would not close the Erith works.

MEETINGS, ETC., FOR THE ENSUING WEEK.

Friday, March 2.—Junior Institution of Engineers: Westminster Palace Hotel, 8 p.m. Paper: "Gas Engine Ignition [illegible]," by L. F. de Peyrecave.

Saturday, March 3.—Royal Institution: Albemarle Street, 3 p.m. Professor J. J. Thomson: "The Corpuscular Theory of Matter" (Lecture I). Institution of Electrical Engineers: Visit of Manchester Students' Section to the Works of Messrs. Ferranti, Ltd., Hollinwood.

Monday, March 5.—Society of Engineers at Royal United Service Institution, 7.30 p.m. Paper: "Submerged [illegible] Grooves," by Mr. R. G. [illegible] [illegible] Engineers, Stratford, [illegible] p.m.: [illegible]

Tuesday, March 6.—Institution of Civil Engineers: Great George Street, 8 p.m.

Wednesday, March 7.—Society of Arts: [illegible] 8 p.m.

Thursday, March 8.—Royal Society: Burlington House, 4.30 p.m. Institution of Electrical Engineers, [illegible]. Junior Institution of Engineers, 8 p.m.

PAGE'S WEEKLY Miscellaneous

CALLENDER'S
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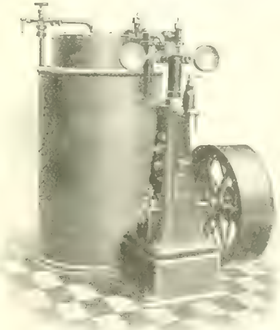

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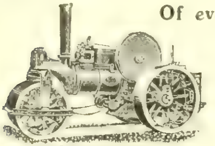
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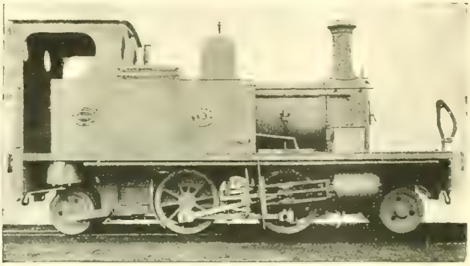

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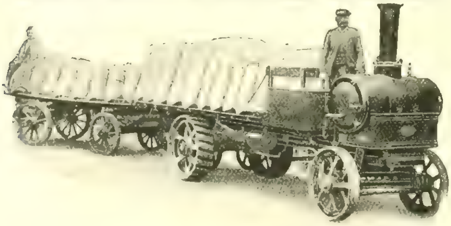

This illustration is of a Steam Wagon to carry 6 Tons and haul 4 Tons on a Trailer.

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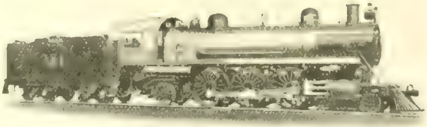

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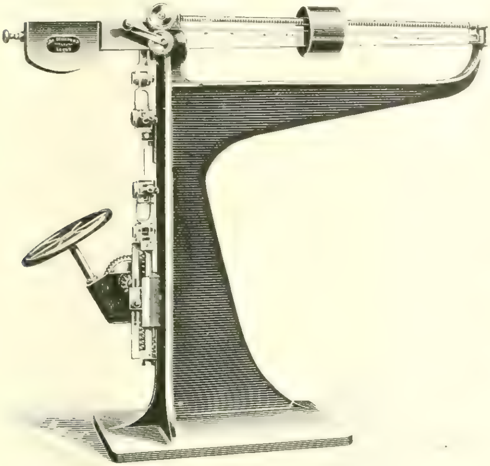

This apparatus is arranged for ascertaining the tensile strength of small wire, and is very accurate.

NO LOOSE WEIGHTS.
ACCURATE EXTENSION GAUGE.

Capacity	1,000	lbs. avoir.	..	(1)
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The 'poise weight carries a vernier to show single pounds.

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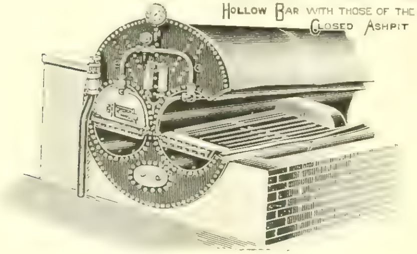

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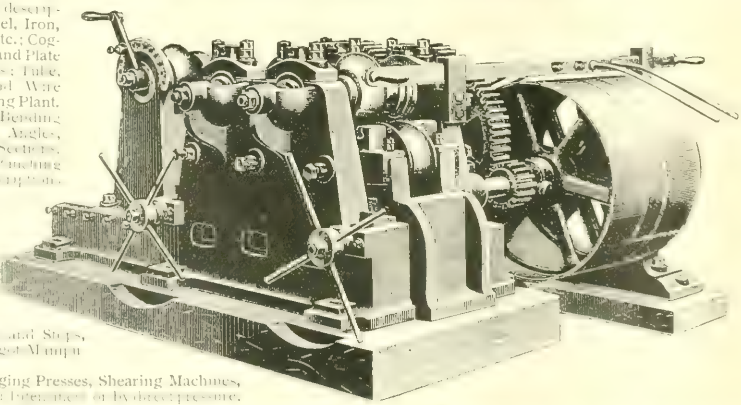

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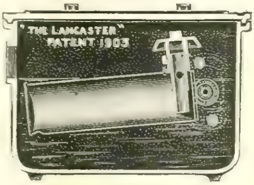

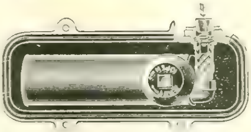

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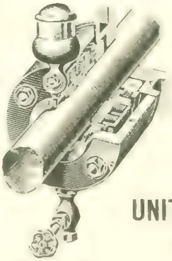

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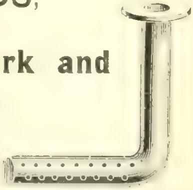

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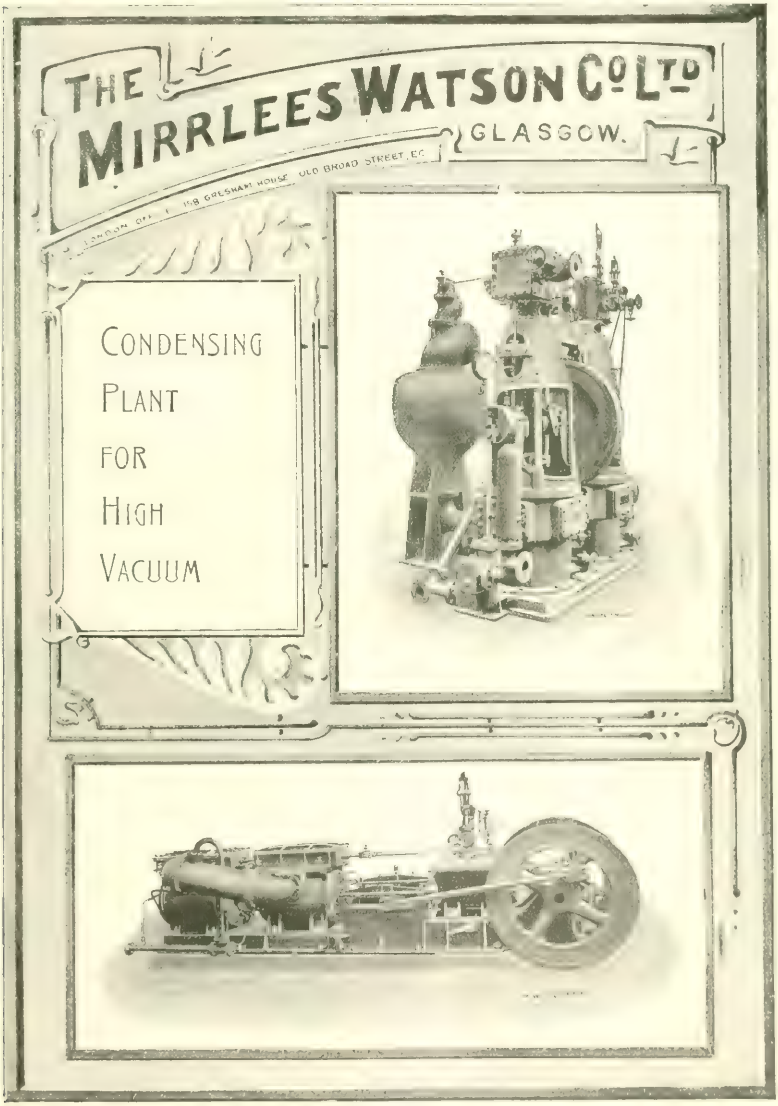

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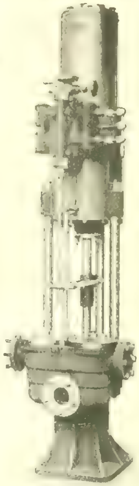

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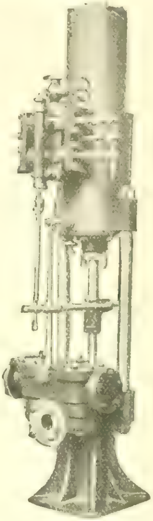

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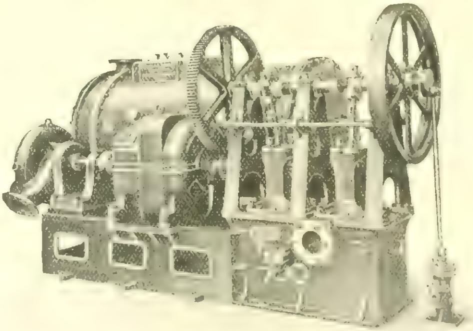

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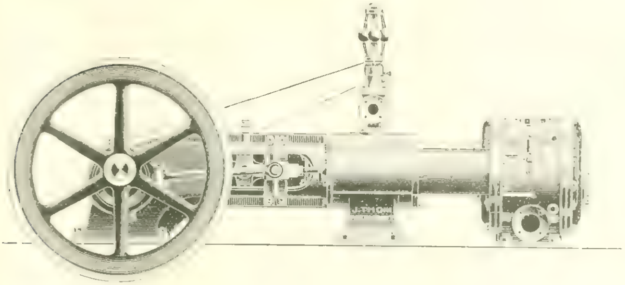

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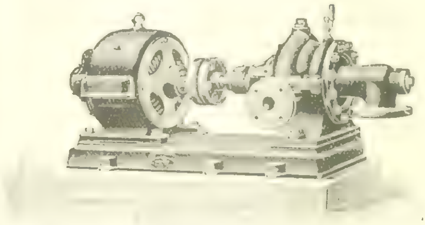

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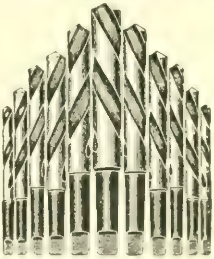

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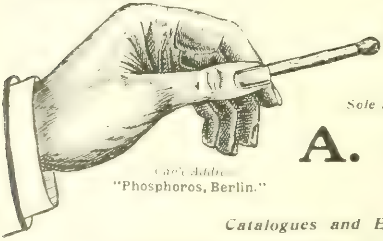

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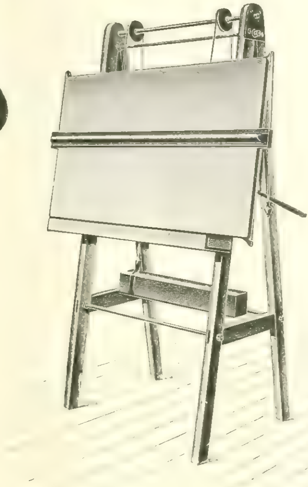

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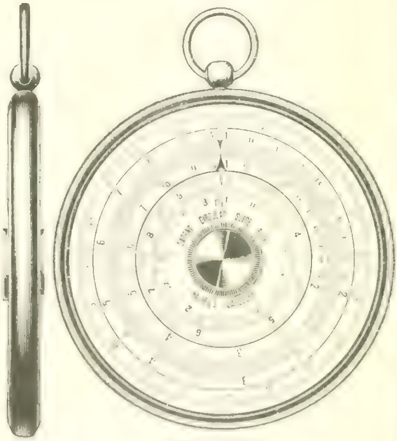

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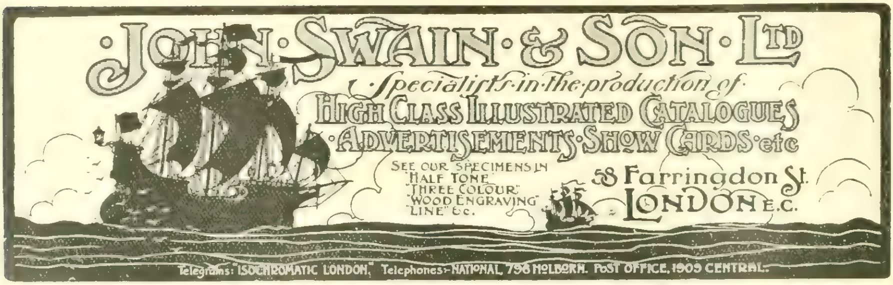
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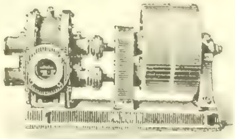

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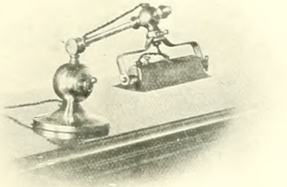

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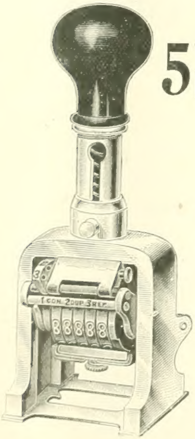

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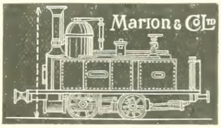

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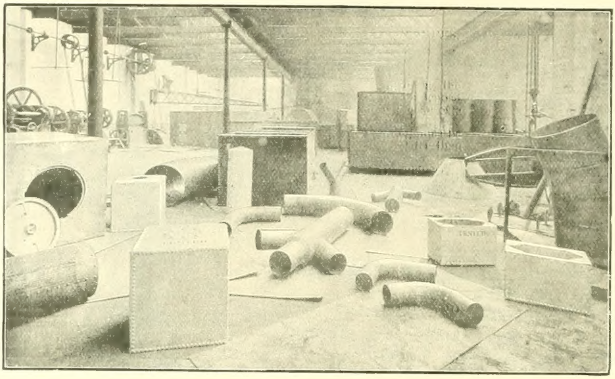

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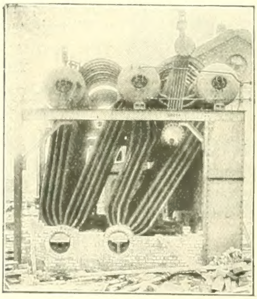

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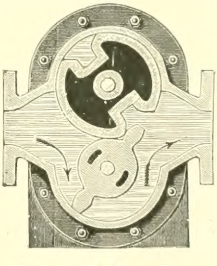

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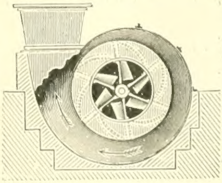

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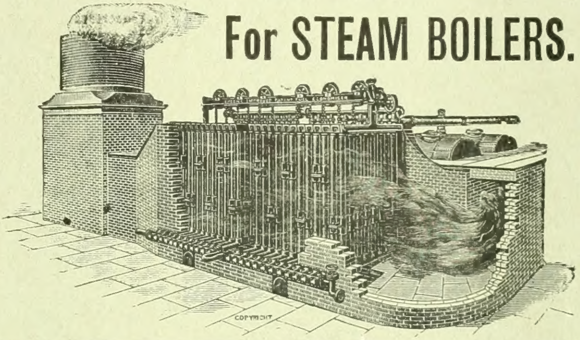

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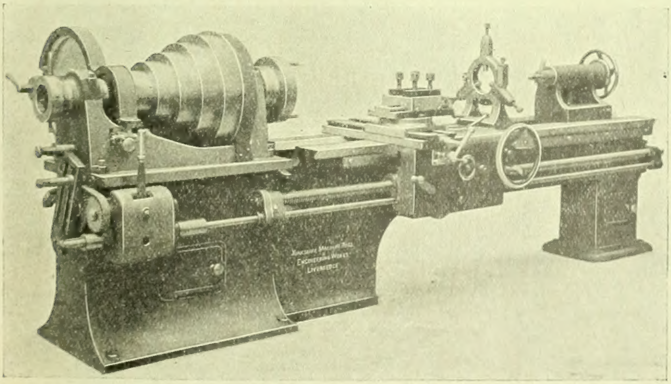

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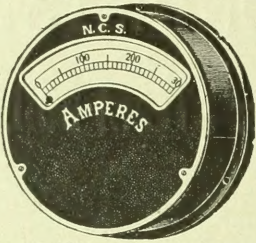

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